Rock Products

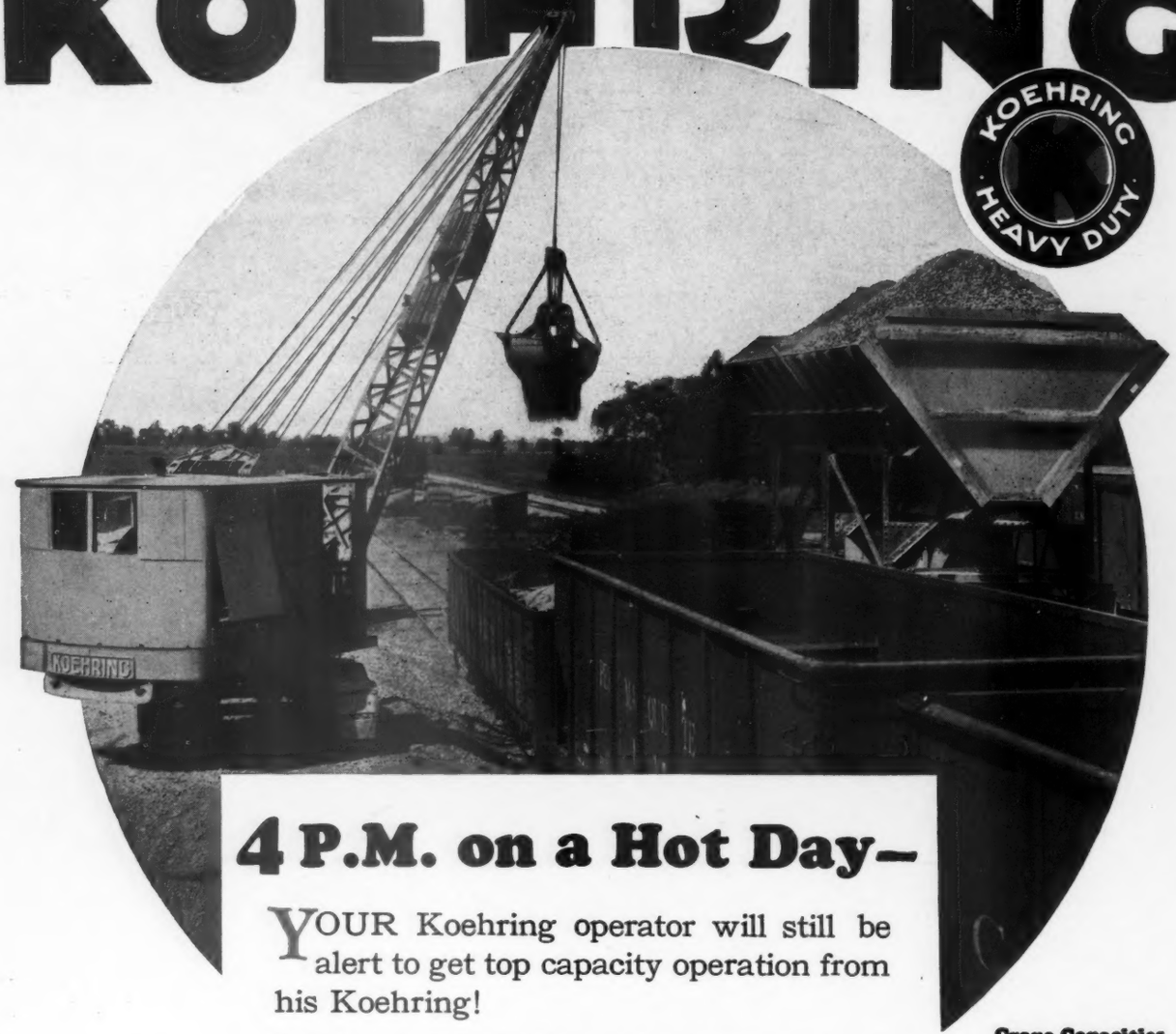
With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Chicago, April 14, 1928 (Issued Every Other Week) Volume XXXI, No. 8

MEMBER A. B. C. *The Only Paid Circulation covering the Rock Products Industry* MEMBER A. B. P.

Printing of This Issue Is 5450 Copies. Next Issue Will Be April 28

KOEHRING



4 P.M. on a Hot Day—

YOUR Koehring operator will still be alert to get top capacity operation from his Koehring!

Koehring FingerTip ease of control keeps him "on the job," interested and eager, and not worn to a "frazzle."

Know the Koehring!

It means high speed precision of operation—higher *earning capacity!*

Again we say—"Know the Koehring!"

Know what Koehring speed means to extra profits — what Koehring Heavy Duty construction means to long service-life.

And again we say "Know the Koehring."

Write for Bulletin C. R. 29

Crane Capacities

Based on 66⅔% of Overturning Load

Quickly convertible to shovel or dragline.

No. 301—10 Tons at 12' Radius. When used with clamshell bucket loaded with dry sand or gravel:

1 Yd. Bucket (weighing empty 3,450 lbs.) at 28' Radius, 40' Boom; ¾ Yd. Bucket (weighing empty 2,600 lbs.) at 34' Radius, 45' Boom; ½ Yd. Bucket (weighing empty 2,050 lbs.) at 41' Radius, 50' Boom.

Wisconsin four cylinder gasoline engine, 5¼" x 6½", 1,000 R. P. M.

No. 501—17 Tons at 12' Radius. When used with clamshell bucket loaded with dry sand or gravel:

1½ Yd. Bucket (weighing empty 4,800 lbs.) at 31' Radius, 45' Boom; 1¼ Yd. Bucket (weighing empty 3,950 lbs.) at 36' Radius, 45' Boom; 1 Yd. bucket (weighing empty 3,500 lbs.) at 41' Radius, 50' Boom; ¾ Yd. Bucket (weighing empty 2,800 lbs.) at 48' Radius, 55' Boom.

Wisconsin four cylinder gasoline engine, 6" x 7", 925 R. P. M.

A4583-1

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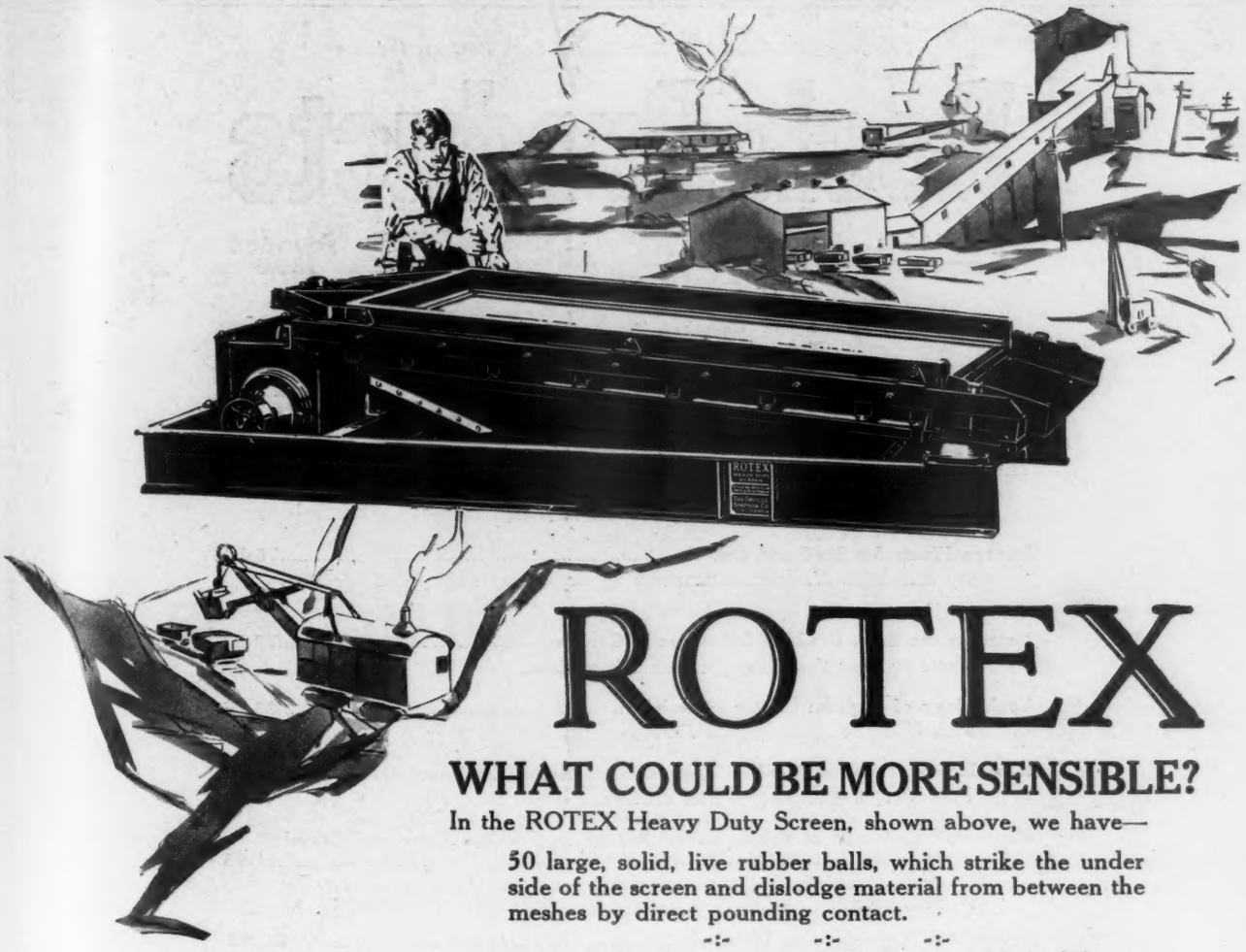

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WHAT COULD BE MORE SENSIBLE?

In the ROTEX Heavy Duty Screen, shown above, we have—

50 large, solid, live rubber balls, which strike the under side of the screen and dislodge material from between the meshes by direct pounding contact.

-:- -:- -:-

a nearly level screen on which the material is slid rapidly forward because of a 3½ in. level, circular motion (not tumbled down hill, or rolled over and over).

-:- -:- -:-

a motion which spreads and stratifies the material, causing the finer particles to sink down against the meshes.

-:- -:- -:-

a rapid and accurate separation, the result of combining the Rotex patented mesh cleaning system with the Rotex level, circular screen motion.

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a large screen of very low head room, waterproof, dustproof, mechanically driven by direct connected motor or lineshaft, and as well adapted to sprays, or dewatering, as to dry screening.

And so, in a very short time, Rotex Heavy Duty Screens have come into quite general use successfully screening crushed rock, crushed shell, sand, gravel, slag, refractory, phosphate rock, and many other materials for which a screen of heavy, rugged construction is necessary.

Rotex Catalog No. 81 contains full specifications, dimensional drawings and net prices

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The Only Paid Circulation Covering the Rock Products Industry

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

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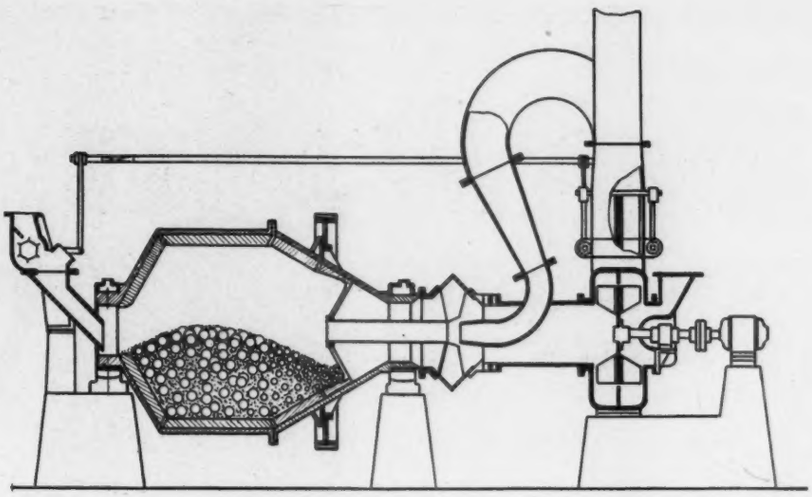

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The Hardinge Unit Pulverizer was developed to combine the pulverizing characteristics of the Hardinge Conical Mill with a system of control that will permit the rate of coal fed to the burner to be varied instantaneously from maximum to minimum. The ratio of primary air to coal fed to the burner is maintained constant through all variations in the load.

Operating costs are low. Conical Mills installed 7 years ago and running constantly have not yet worn out the original lining.

Write for our Bulletin No. 27, which describes the Unit Coal Pulverizer

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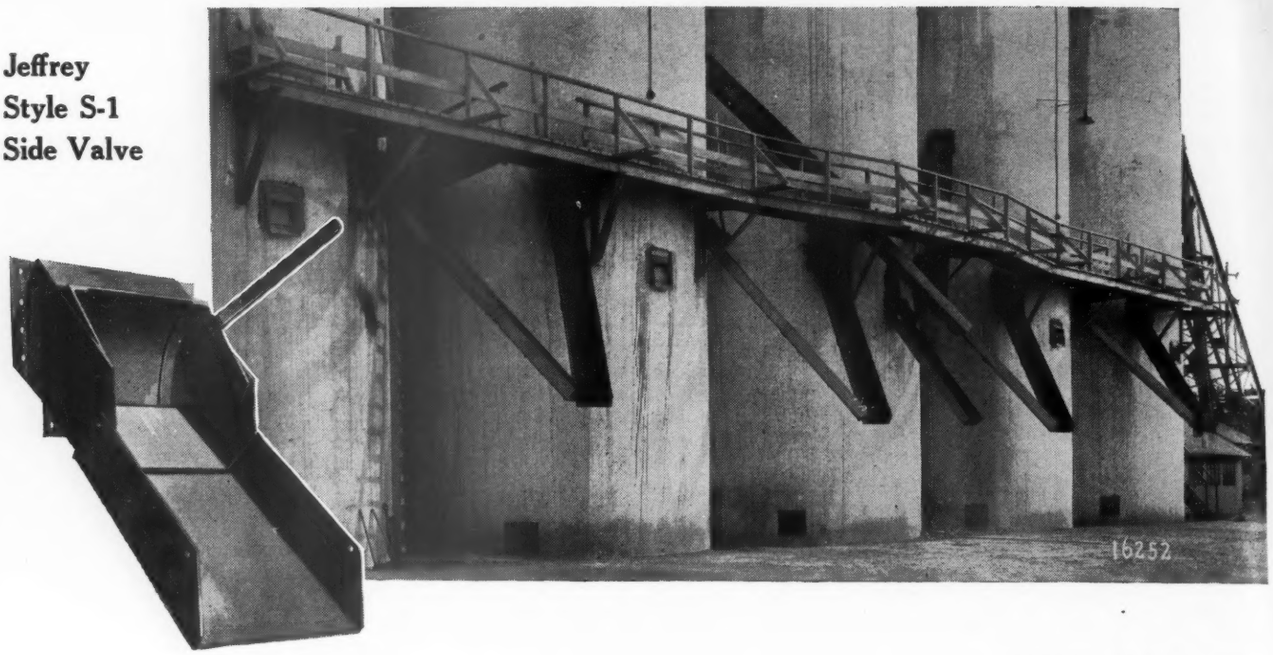

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Style S-1
Side Valve

Jeffrey Loading Valves and Chutes

at the
Arrow Sand and Gravel Company

Jeffrey shops are prepared to make quick delivery of chutes formed from stock sheets in the styles shown at the right.

Remarkable low prices are quoted on these chutes. They can be produced in a variety of widths and depths, governed only by the width of the stock. Supplied cut to fit the job, or in standard lengths.

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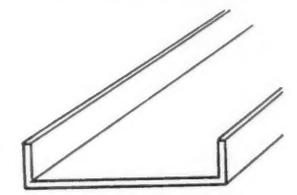
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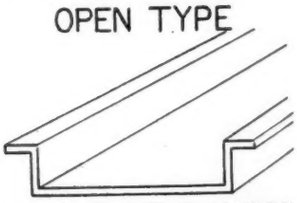
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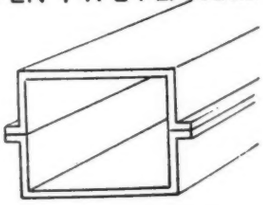
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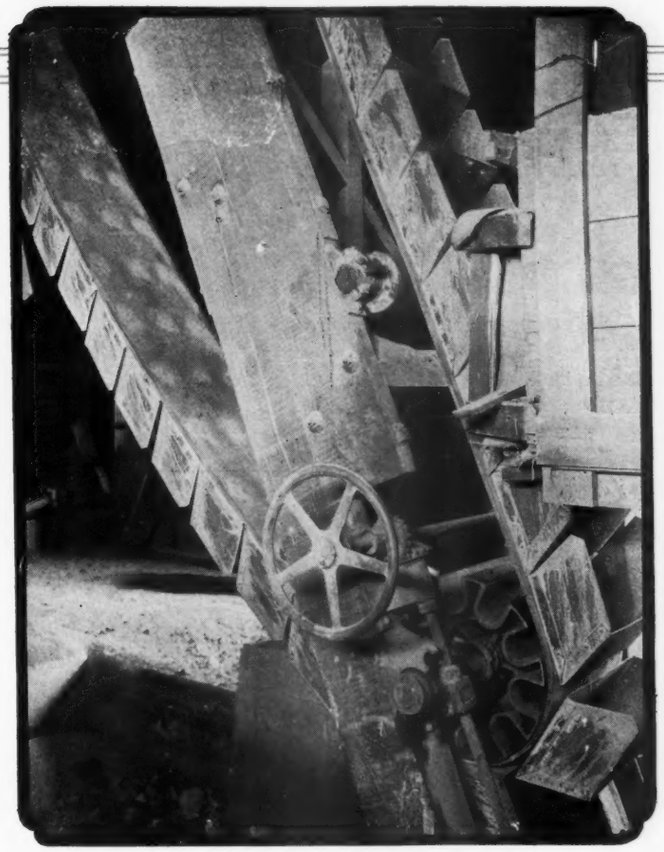

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MORECON: for slightly-abrasive materials such as sand and clay.

AKRON: for general service where hard, abrasive materials such as stone and slag are to be elevated.

NEW MINING: a super-belt with triple-thickness cover for extremely abrasive, heavy duty, handling wet or dry materials.

SUPER-ELEVATOR: a shock-absorbing belt, with exceptional strength to absorb concussion and withstand punches and blows. Recommended for handling the heaviest, largest lump materials.

Let Goodrich engineers cooperate with yours in the solution of any problem involving the conveying or elevating of any material; fine or coarse; abrasive or non-abrasive; wet or dry.

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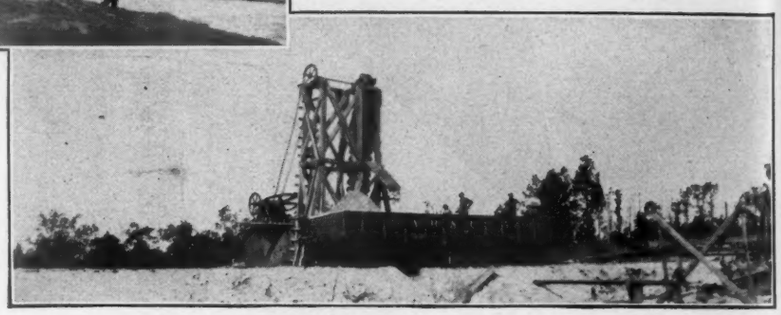
Established 1870 Akron, Ohio

Goodrich Elevator Belts

Washing Sand - - -

One of the three Dorrco Sand Washers installed on the dredge "Magic City" of the Meteor Transport & Trading Company.

Dorrco Sand Washer operated by the Central of Georgia Sand Co., Brownsand, Ga.



On Land and On Dredges

DORRCO SAND WASHERS are applicable to both land and dredge operations. They are complete self-contained washing units requiring only a small amount of space. For dredge operation, the limited amount of headroom required is a particularly valuable consideration. The washed and drained sand is actually discharged from the washer at a higher elevation than that at which the feed enters.

Dorrco Sand Washers deliver a clean, drained sand at an extremely moderate power cost. Discharge moisture averages 15-20%, while power requirements seldom exceed 7-10 H. P. Capacities range up to 200 tons per hour.

Dorrco Sand Washers are ruggedly built and are continuous and automatic in operation. Bulletin No. 4171 describes the machine in detail. On request to our nearest office, we will gladly send you a copy.

DORRCO

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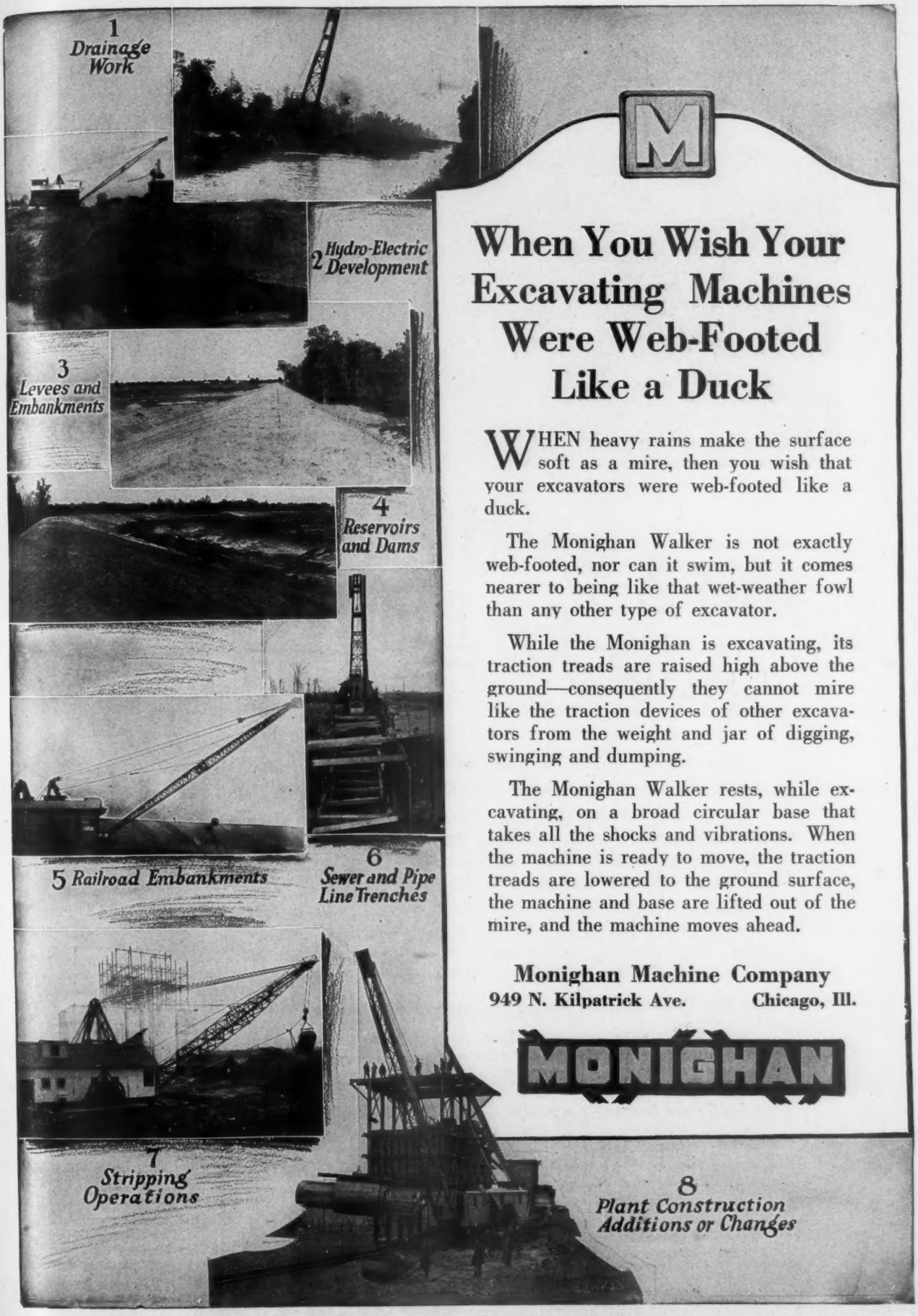

When You Wish Your Excavating Machines Were Web-Footed Like a Duck

WHEN heavy rains make the surface soft as a mire, then you wish that your excavators were web-footed like a duck.

The Monighan Walker is not exactly web-footed, nor can it swim, but it comes nearer to being like that wet-weather fowl than any other type of excavator.

While the Monighan is excavating, its traction treads are raised high above the ground—consequently they cannot mire like the traction devices of other excavators from the weight and jar of digging, swinging and dumping.

The Monighan Walker rests, while excavating, on a broad circular base that takes all the shocks and vibrations. When the machine is ready to move, the traction treads are lowered to the ground surface, the machine and base are lifted out of the mire, and the machine moves ahead.

Monighan Machine Company
949 N. Kilpatrick Ave. Chicago, Ill.

MONIGHAN

Keeping up with the times calls for Big Production

More and more, the keynote of the crushed stone and gravel producers is *"get bigger production."*

In the big quarries, and also in some of the medium sized quarries, you see more and more BUCYRUS-ERIE heavy duty 2-yard, 3-yard, and 4-yard full revolving shovels—speeding up production and increasing profits.

These heavy-duty machines are in nearly all cases electric drive—where electric power is available at reasonable cost, and where the quarry or pit operation is carefully planned so that the shovel can make steady progress and work at least one full shift a day.

On Big Tonnages, the Larger Machine Means Larger Profits

Sometimes cutting down the drilling and hauling costs by working a higher face; often handling the rock or cemented gravel with considerably less blasting. And making bigger tonnages right along, *at a lower cost per ton.* Write us for action photos and output records of these BUCYRUS-ERIE large capacity revolving shovels.

A Union of Strength

"BUCYRUS" and "ERIE"—each the most successful manufacturer in its particular field—consolidated Jan. 1, 1928. The unmatched resources of BUCYRUS-ERIE assure the buyer of Unequalled Value.

More Efficient Machines, Permanence of the Manufacturer, and a More Complete Field Service.

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BUCYRUS ERIE

Niagara *Ball and Roller Bearing* Counterflow Screens

Triple deck unit, showing panel being removed from front end. Panels may be removed from either end, and may be equipped with different mesh cloths for various combinations.

Made in four sizes: One, two, and three decks

GUARANTEE that no grit or foreign matter in a wet or dry system can enter our bearings. GUARANTEE for one year bearings, housings, seals and main drive shaft. If producer uses clean lubrication and a little care, he should get years of service just as our customers are getting—from gold mines in Alaska running twenty-four hours per day to the largest producers in United States and Canada.

ACTION: A complete rotating motion over the entire Screen body. This rotating action is operated against the flow of material which action immediately separates the material, taking the minus thru, giving a very high grading efficiency.

Let us make tests against anything you have ever had, on any class of material ranging from 8″ opening to 325 mesh.

Write for complete details of this super-efficient Screen

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Sturdy Hyatts for Cottrell Screens

Years of flawless bearing performance under the stress of heavy service demands has made Hyatt an overwhelming favorite with the manufacturers of Cottrell Screens.

Grit and dustproof Hyatts eliminate friction and wear—prolonging the life of the entire equipment.

With Hyatts there are no costly bearing delays. They withstand the severe shocks and constant pounding of steady service and ask no time out for repairs or replacements. An occasional lubrication is the only attention they require.

Concentrators, conveyors, excavators, steam shovels and other important equipment, using Hyatts, are assured the same dependable bearing performance.

Cottrell screens and concentrators, built by Cottrell Engineering Co., Los Angeles, California, are equipped with Hyatt Roller Bearings

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Send me ..... copies of your new booklet "Choosing a High Temperature Cement".

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NOT all high temperature cements are equally effective under *all* conditions. For example, a high temperature cement which gives satisfactory service in a certain furnace application may fail utterly in a cement or lime plant. Another high temperature cement, used with satisfactory results in the electric melting of bronze and brass may be ineffective in the combustion chambers of a powdered fuel furnace because of the cement's susceptibility to the corrosive constituents present in fuel ash.

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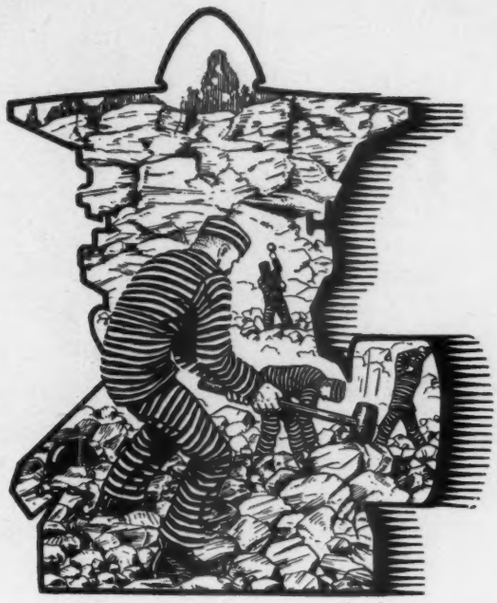
A Life Sentence



A tough sentence, and a hard job—but not for Austin Gyratory Crushers—they are built to stand the rack and strain of the hardest crushing job on the hardest rock pile.

Correctly designed from hopper to discharge spout, from spider to driver—gyratory action with ample power and capacity—rugged oversized parts—non-clogging—an Austin sentence to the rock pile never ends.

Austin Gyratory Crushers have crushing ability, plus stamina, to serve their full time—ask any user—be a witness.

Do not accept circumstantial evidence; *write us today*—get the facts NOW.

AUSTIN MANUFACTURING CO.

ESTABLISHED 1858

400 N. MICHIGAN AVE. CHICAGO

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Blueprint sketch of Goodyear Suction Hose and Dredging Sleeve; insert photographs of (top) Weston Sand and Gravel Co., installation; (bottom) Central Dredging Co.'s whaleback sandboat

That Extra Yardage—and the G. T. M.

When you are after yardage—lots of it, fast, and at low cost—no part of your equipment counts more for efficient, economical operation than your suction hose and dredging sleeves. The *right* suction hose and the *right* dredging sleeves are a product of good manufacture, according to proper specification to your needs. And correct specification is the job of the G. T. M.—Goodyear Technical Man.

Two examples from the records of G. T. M.-specified Goodyear Suction Hose and Goodyear Dredging Sleeves in the service of dredgers operating under widely different conditions may be cited to show how the right construction, based on scientific analysis of the duty required, results in extra life, extra yardage, trouble-free operation, and economy.

Weston Sand and Gravel Company, of Logtown, Mississippi, put a new dredge into service on the lower reaches of the Mississippi in July, 1925. For eight months they used different kinds of suction hose, getting an average of about two months service to the hose. In February, they called in the G. T. M. This expert on hose made a careful analysis of all the mathematical and working factors affecting the installation, and on that basis recommended 10-inch, 8-ply Goodyear Sand Suction Hose.

"Since the day it was installed, over two years ago, this piece of Goodyear Hose has been in continuous daily operation, except for a period aggregating three months when the dredge was stopped for repairs, and for 12 months of the time in both *day and night* work," says President C. W. Weston. "It is in good condition today, showing no evidence of failure. Its performance, and further G. T. M. recommendations, prompted our equipping our other dredges 100% with Goodyear—both suction hose and sleeves—and also using Goodyear Chute Lining in our rotary screen plant."

The Central Dredging Company, of Chicago, has been using G. T. M.-specified Goodyear Dredging Sleeves from 18 inches to 8 feet in length and of 18- and 24-inch inside diameter for the past five years in its sand filling operations at Chicago, employing them, in one interesting instance, in the steamer-to-shore line from the first whaleback steamer ever converted into a sandboat.

"We have Goodyear Sleeves still in use that were supplied as long ago as August 10, 1926," reports Mr. C. R. Dietz, Secretary. "They have lasted twice as long as any others we have used. We have handled about 1,750,000 yards through them, and our Engineer tells me he thinks they are good to go over the 2,000,000 mark."

Goodyear Hose for every purpose is G. T. M.-specified to insure longer, more economical and more efficient service. Its performance proves the value of the Goodyear Analysis Plan, the G. T. M. method, and Goodyear manufacturing. For detailed information about any Goodyear Mechanical Rubber Goods—Hose, Belts, Valves, Packing—or the expert work of the G. T. M., write to Goodyear, Akron, Ohio, or Los Angeles, California.

The Greatest Name in Rubber

BELTS • VALVES HOSE • PACKING

GOODYEAR

11 ft. 6 in. by 300 ft. Traylor Kiln in the Houston, Texas, Mill of the Trinity Portland Cement Co.
INSET: One of the four Traylor Roll Supports on which the kiln revolves—showing the rolls and kiln thrust bearing

TRAYLOR Rotary Kilns

GIANT Traylor Rotary Kilns—the biggest used in the cement industry—have won for themselves the reputation of being at once highly efficient in clinker production and remarkably **easy on power.** In the case of the installation pictured above—though the kiln is driven by a 150 hp. motor—actual measurement of power consumed has shown that 75 hp. is all that is required to turn the kiln under normal conditions.

The small amount of power required to drive Traylor Kilns is attributable in large measure to the Single Roll Support. This provides for easy and accurate lining up of the roller **before** the shell is set in position. Then, too, simple adjustment devices are employed which may be operated while the kiln is running, so that true alignment of the shell is permanently maintained. Traylor Kilns always **run true**—with no waste of power!

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"You said—

'Try it and let us know'. . .

. . . here is our answer—and How!"

Gentlemen:

In June of this year, 1927, we purchased a new one-half yard General Excavator gasoline caterpillar shovel, with two attachments, one as a shovel and the other as a hoe to dig trenches. We used it as a shovel on the first job and as a hoe on the second job.

The trench we were to dig was twenty-four inches wide and five feet deep through clay and rock. The rock was of a seamy composition which made it bad to try and shoot and therefore had to be taken out with the hoe.

When the shovel is working as a hoe the pull on the hoe cable is tremendous, so much so that if the "cat" locks are not in place it will pull itself forward over a 12″ x 12″ timber, and you can imagine what happens when the hoe is coming out of the trench and it hits a solid rock or stump,—the engine stalls or the cables break and we soon found out that the engine wouldn't stall, as was evidenced by the number of pieces of new cable used.

After a tough week and using a lot of different makes of cable we called you and you recommended your 6 x 25 TRU-LAY cable which we sent for right away and set back to see it break, but it didn't. It completed that job and in all did about 15,000 lineal feet of trenching besides excavate three cellars.

We can honestly recommend this cable to any one who wants a cable for the worst kind of abuse and hard work, and for the benefit of any one concerned we wish to state that this recommendation comes from us unsolicited by you. You said "We have what you want. Try it and let us know how you like it"—and this letter is "how."

Make your own test!

Tru-Lay has proved its superior performance on the hardest sort of work in every cable-using field. It will pay any rope user who wants more for his money to investigate. Why not send for a sample now and test Tru-Lay preformed construction for yourself? Your name and address bring it.

AMERICAN CABLE COMPANY, *Inc.*
Grand Central Terminal Building, New York City
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An Associate Company of the American Chain Company, Incorporated

PREFORMED WIRE ROPE

TRADE **TRU-LAY** MARK

(Reg. U. S. Pat. Off.)

Dominion Wire Rope Company, *Limited*, Montreal
Sole Canadian Licensed Manufacturers

This Byers "Master" Shovel dug 600 to 700 cubic yards per day, with 2 to 3 feet of frost, in gravel pit in Central City, Iowa, this winter

You Appreciate Progressiveness

WHEN a shovel has been discussed as enthusiastically as the Byers "Master," and has been accepted as the most important development of recent years in the shovel field, there must be good reasons.

You will find it well worth your while to study the outstanding features of this shovel. A new catalog, just off the press, tells about them.

The "Master" has a little more range, a little more power, a little more speed, a little more flexibility than you find in other gas shovels and cranes of the same rating.

You are familiar with shovels in general and you know the value of these specific advantages—you will want a copy of the new catalog that describes them in detail.

Wire or write for catalog and full details

THE BYERS MACHINE COMPANY, Ravenna, Ohio

Sales and Service Throughout the Country

Builders of the Bear Cat (½ yard), the Bear Cat "Whirly" (¾ yard), "Master" Gas Shovels (1 and 1¼ yards), and Massillon Steam Shovels

BYERS "Master" Shovel

1 and 1¼ Cu. Yard Gas

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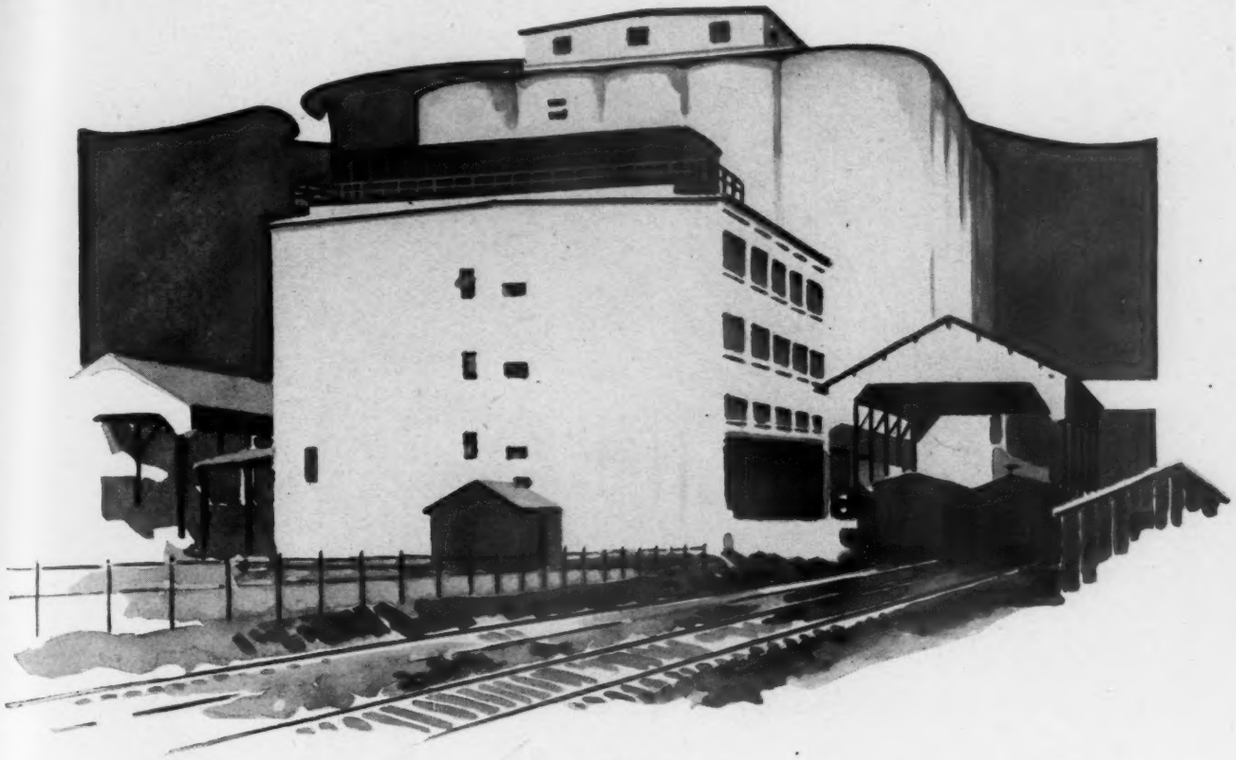

Sly Dust Arresters are serving many purposes in cement plants—exhausting and arresting dust created at baggers and bag cleaning wheels—cooling cement—ventilating finish grinding mills—ventilating conveyors, screens, etc.

Excessive, **needless** wear on machinery, caused by the abrasive action of dust, is eliminated; dust formerly wasted is bagged and sold; working conditions are improved—for these reasons, nearly one hundred cement plants have installed more than 250 Sly Dust Arresters.

If you have a dust problem in any part of your plant, a Sly Engineer will be glad to call and recommend the necessary Dust Arrester equipment.

Write for Bulletin S-125

The W. W. Sly Manufacturing Company
Cleveland, Ohio

Branches in Principal Cities ***Established 1874***

SLY Dust Arresters

When writing advertisers, please mention ROCK PRODUCTS

Builders of the famous B. & B. Aerial Tramways for industrial haulage

Important!

WHICH is most important—a reliable crane, a reliable bucket, or reliable wire rope? As well ask which is the most important leg of a three-legged stool.

Yellow Strand Wire Rope, supreme in strength and elasticity, is a legitimate part (not accessory) of all heavy-duty hoisting machinery.

Write for Catalog 27 and name of nearest distributor of B. & B. Ropes.

BRODERICK & BASCOM ROPE CO., St. Louis, Mo.

Eastern Office and Warehouse: 68-70-72 Washington St., New York
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YELLOW STRAND WIRE ROPE

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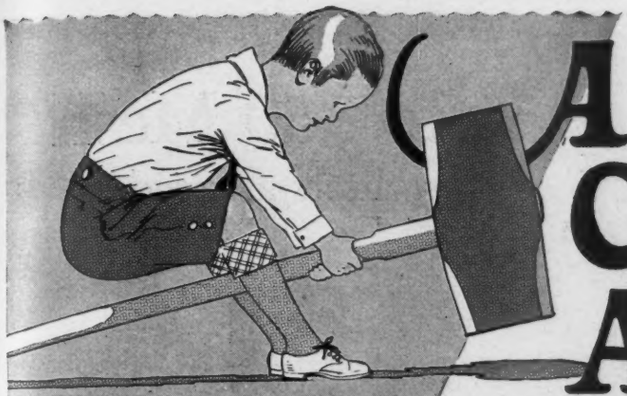
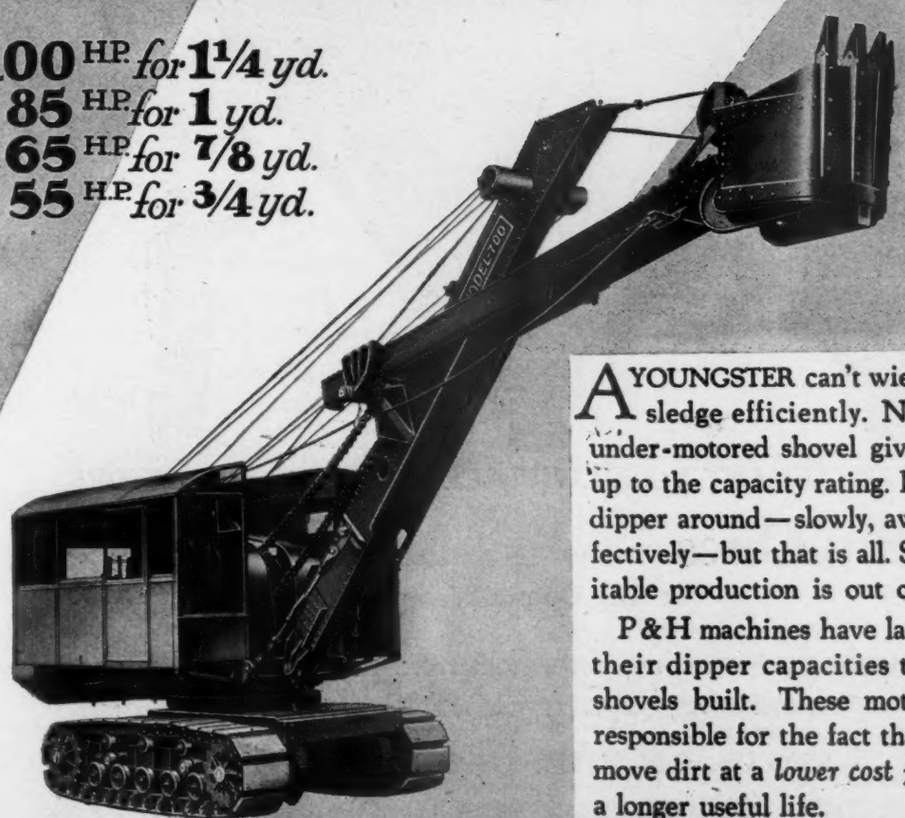


A Little Boy Can't Handle A Sledge and Hammer

A Small Motor Can't Handle a Large Dipper!

100 H.P. for 1¼ yd.
85 H.P. for 1 yd.
65 H.P. for ⅞ yd.
55 H.P. for ¾ yd.



A YOUNGSTER can't wield a man's size sledge efficiently. Neither can an under-motored shovel give performance up to the capacity rating. It can move the dipper around—slowly, awkwardly, ineffectively—but that is all. Sustained, profitable production is out of the question.

P&H machines have larger motors for their dipper capacities than any other shovels built. These motors are largely responsible for the fact that a P&H will move dirt at a *lower cost per yard*—over a longer useful life.

P&H

HARNISCHFEGER CORPORATION
Established in 1884
3865 National Avenue, Milwaukee, Wis.

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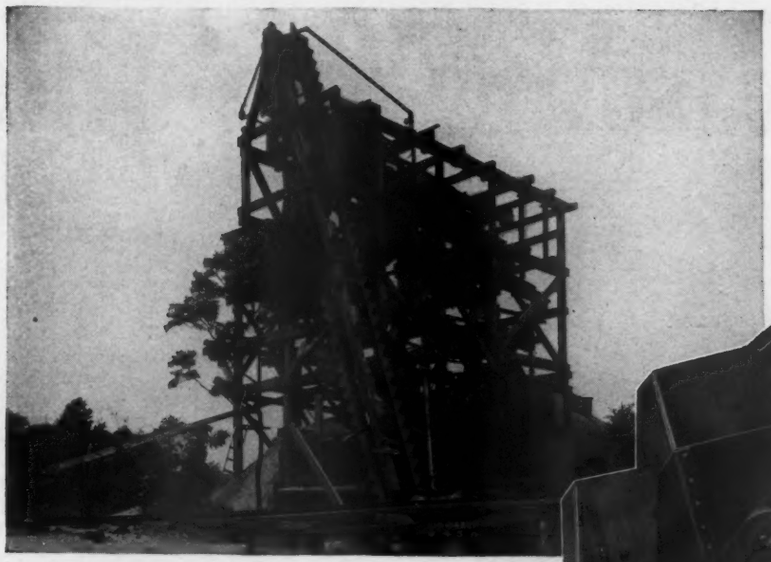

A typical illustration of Link-Belt Continuous Bucket Elevator raising sand and gravel to the screens.

Section of a Link-Belt Super-Capacity Continuous Bucket Elevator. Note how the face of each bucket forms a discharge chute for the bucket following.

Elevate Your Crushed Stone Sand and Gravel The Link-Belt Way

THREE general types of elevators are adaptable to the work of raising materials, the choice of which depends on the particular conditions existing in each case. These are: (1) the continuous bucket elevator; (2) the centrifugal discharge elevator, and (3) the digging elevator.

Invite us to go over your plant with you and make recommendation.

Address our nearest office for a copy of Book No. 540.

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Elevators and Conveyors
Stone and Lime Handling Equipment
Locomotive Cranes
Crawler Cranes
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Dragline Excavators
Screens
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LINK-BELT

Sand and Gravel Washing Plants

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Built for the Grind of Service

No matter how tough the job—Falk Herringbone Gears are built to meet the requirements with a wide margin for safety. It is in carrying gigantic loads under the most severe conditions that these gears prove their value on the job. Made with staggered and continuous teeth to cover every requirement from a diameter of 1 in. to 16 ft., any face from 1 in. to 6 ft., any pitch from 25 D. P. to ¾ D. P. Our engineers will be glad to work with you on your requirements.

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Designed Flexibility

Falk Flexible Couplings are designed as accurately as Falk Precision Cut Herringbone Gears. The capacity is as safely fixed. Dependability is as definitely assured. Full flexibility is provided in each coupling in sizes from 1-5 H. P. to 26,000 H. P. at 100 R. P. M. Flexibility, which takes up shock, damps out vibration, gives free end float at all loads. There is no wear-out, and no noise with this coupling. Send for bulletin No. 150, giving capacities and dimensions. Quotations furnished on request.

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This New Method~

MANY quarry operators have found by actual experience that two 1¼ yard gasoline shovels are more economical to operate than one shovel of twice that capacity—if they can stand the rough handling of quarry work.

The Lorain 75 stands up to the hardest quarry work — day after day, month after month because the Thew Center-Drive makes the Lorain 75 a different kind of machine. The astounding performance of the Lorain 75 on quarry work is selling Lorain 75s to the entire excavating field.

THEW CENTER DRIVE

Quick convertibility for crane or dragline service enables part of your equipment to be used for stripping, stock-piling or other work during slow production periods.

Thew and Thew only has the Center-Drive. Write to-day for information as to how Center-Drive can increase your production—and profits.

THEW SHOVEL COMPANY • LORAIN, OHIO

THEW

Gasoline or Electric Powered

LORAIN 60 AND 75

Shovels Cranes and Draglines

When writing advertisers, please mention ROCK PRODUCTS

Regulating Production By Storing Surplus Rock With Sauerman Power Scrapers

The Universal Gypsum and Lime Company supply both their plants at Ft. Dodge, Iowa, with gypsum rock mined from across the Des Moines River.

All rock is crushed to mill size at the mine and transported to the mills by aerial tramways. And at both mills the tramways were able to store a small amount.

But this small tonnage of stored materials didn't keep the mine operating steadily. When sales dropped, the mine had to be closed down and when sales fluctuated the mine couldn't keep up with the necessary production.

Finally to cope with seasonal demands and to maintain a steady working schedule, in both mine and mill regardless of fluctuations of orders, the company decided to find an economical way to store the raw materials.

The storage areas available were odd in shape and various methods of storing were considered. But after due consideration the company installed a 1 cu. yd. Sauerman "Crescent" Drag Scraper at one mill and a ½ cu. yd. Sauerman "Crescent" Drag Scraper at the other.

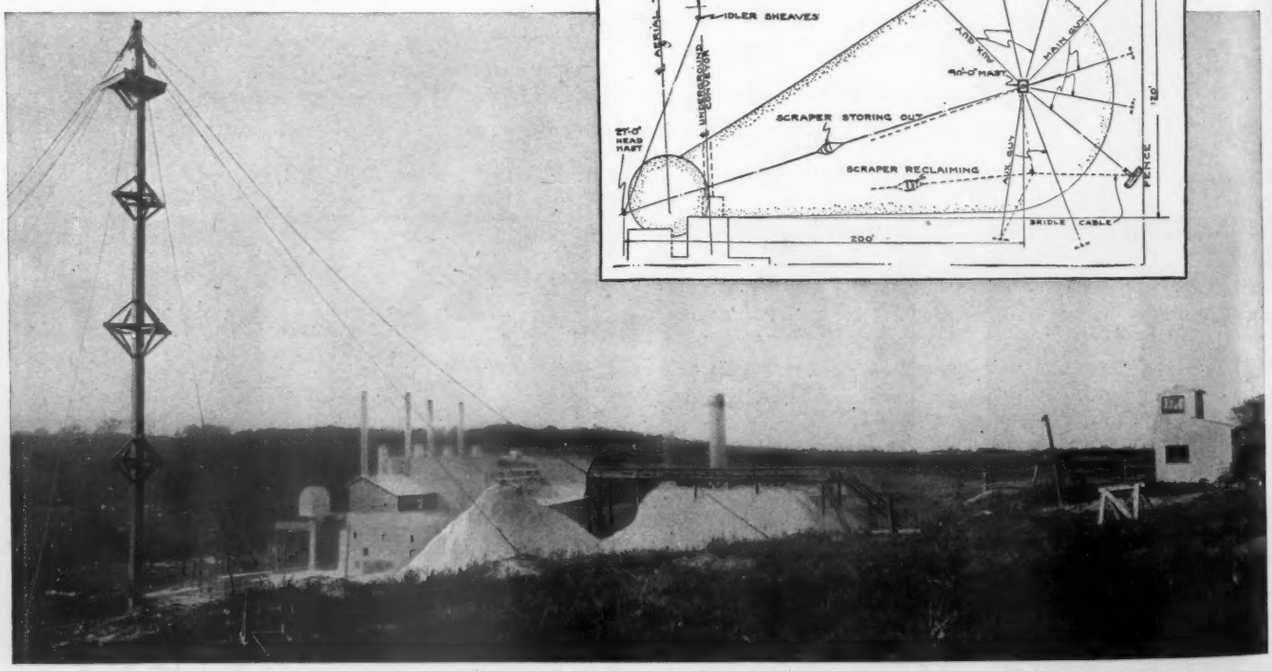
This storing and reclaiming equipment proved to be the most economical from the standpoint of first cost and operating cost. With a relatively small investment, the company provided the two mills with storage systems that will stock out nearly 20,000 tons of crushed rock on waste ground adjacent to the mill buildings. The only labor involved is one man to operate each scraper system.

When the demand of the mills is greater than the incoming supply from the mines, the Sauerman "Crescent" Scrapers feed the mills from storage with the required tonnage of rock, namely, 30 tons per hour at one mill and 60 tons per hour at the other.

If you are interested in seeing how other companies are using Sauerman Scrapers to cut the cost of handling bulk materials, write for the new Scraper booklet. Its 90 pages are filled with the kind of information that may help you solve your material handling problems. Just mail a post card asking for booklet No. 10.

SAUERMAN BROS., Inc., 430 South Clinton Street, Chicago, Illinois

Photograph and drawing show Sauerman Scraper layout for storing rock on sloping ground at Iowa gypsum mill



"In a Test Case We Pushed a 50 Ton Load up Our 2% Grade

—This consisted of ten quarry cars loaded with stone"

The statement above is part of the letter and a report on the operation of an eight ton Plymouth Gasoline Locomotive purchased by The Tarbox-McCall Stone Co. on March 18, 1927.

Their regular operation is pushing five cars loaded to 6 tons over a three-eighths mile track which has a 2 percent grade and sharp curves. Pushing in a net tonnage of stone averaging 500 tons per 9 hour day shows a net average gasoline consumption of only 10 gallons.

When put to the task — the Plymouth shows its worth. Our one dominant purpose year after year is to build the best Gasoline and Diesel Locomotives in the world.

PLYMOUTH LOCOMOTIVE WORKS
The Fate-Root-Heath Company
PLYMOUTH, OHIO

THE TARBOX-McCALL STONE CO.
MANUFACTURERS OF
Crushed Stone and Stone Sand
FINDLAY, OHIO

August 6, 1927.

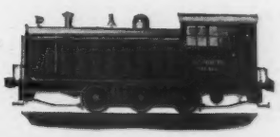
The Fate-Root-Heath Co.
Plymouth, Ohio.
Gentlemen:

We very much appreciate the fact that you are interested in seeing that we are satisfied with our Plymouth. You have always taken care of our needs and we are glad to assure you that we are well pleased with the performance of our machine.

In a test case we pushed in a 50 ton load over our tracks. This consisted of ten quarry cars loaded with stone. This was done without difficulty. We have some sharp turns and a grade of better than two per cent. The operation of the Plymouth has been very satisfactory.

We can produce seven hundred ton of stone in nine hours. The limestone is equal to the best in the state. The plant is entirely operated with electricity with the exception of the Plymouth and our delivery trucks.

Yours very truly,
THE TARBOX-McCALL STONE CO.
E W McColl



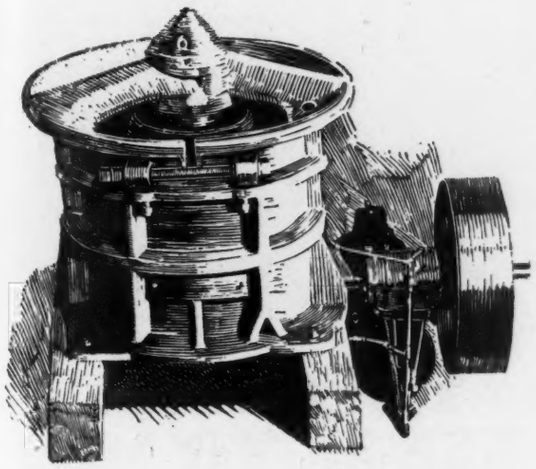
30 Ton Gasoline or Diesel

Plymouth Gasoline and Diesel Locomotives are built in a full range of sizes from 2 to 50 tons. Designed to reduce fuel and operating costs to a minimum.

PLYMOUTH
GASOLINE *Locomotives* DIESEL

If it's a Track Haulage Problem, There's a Plymouth to Solve it.

600 feet underground for 7 years - going still lower



—that's the record of Old Telsmith No. 599—an 18 inch Primary Breaker—shipped on Oct. 13, 1920, to the Odgers Mine of the Corrigan-McKinney Steel Co., Crystal Falls, Mich. Right now, the old cuss is being dropped to the 800 ft. level for another long session.

Old Telsmith 599 is a real miner—works 600 feet below ground—taking the iron ore direct from the cars as it is mined. The shaft was of such limited cross section that 599's crown, and frame, too, were made of special design to cut the clearance required. Even then it was a close squeeze.

The space allotted to this crusher is very limited, making repairs quite difficult. No provision could be made for catching tramp iron, so considerable steel gets into the machine. Yet Old Telsmith 599 has been operating since 1920 with an astonishingly low maintenance expense—crushing a very satisfactory output and doing good work all-around.

Telsmith 599 is an old model machine, with a steel crown but with an iron frame. Since 1923, every Telsmith Crusher has ***both frame and crown of steel***—guaranteed for two years against breakage, even by tramp iron. Permanency is only one Telsmith advantage—let us tell you about the others. Catalog 166 (Telsmith Primary Breaker) and Bulletin 2F11 (Telsmith Reduction Crusher) mailed free. ***Write for them.***

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P. B. 22

TELSMITH

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SHOVEL — Ditcher — Skimmer — Dragline — CRANE

"THAT SOUNDS LIKE SENSE TO ME"

"I CAN buy an Insley for half what it would cost me to buy a big outfit, and I know I couldn't get a better piece of machinery if I paid three times as much as an Insley would cost me. I can get three or four hundred yards a day out of it and can do any kind of work there is to be done.

"And I can make more money on my grading, side ditching and unloading with my Insley than with anything else I know of and that's what counts these days.

"There's no use talking, I'm better off with one or two Insleys than I am with anything else, and I'm no different from any other fellow who wants to stay in business."

604

INSLEY MANUFACTURING COMPANY - Indianapolis

Engineers and Manufacturers

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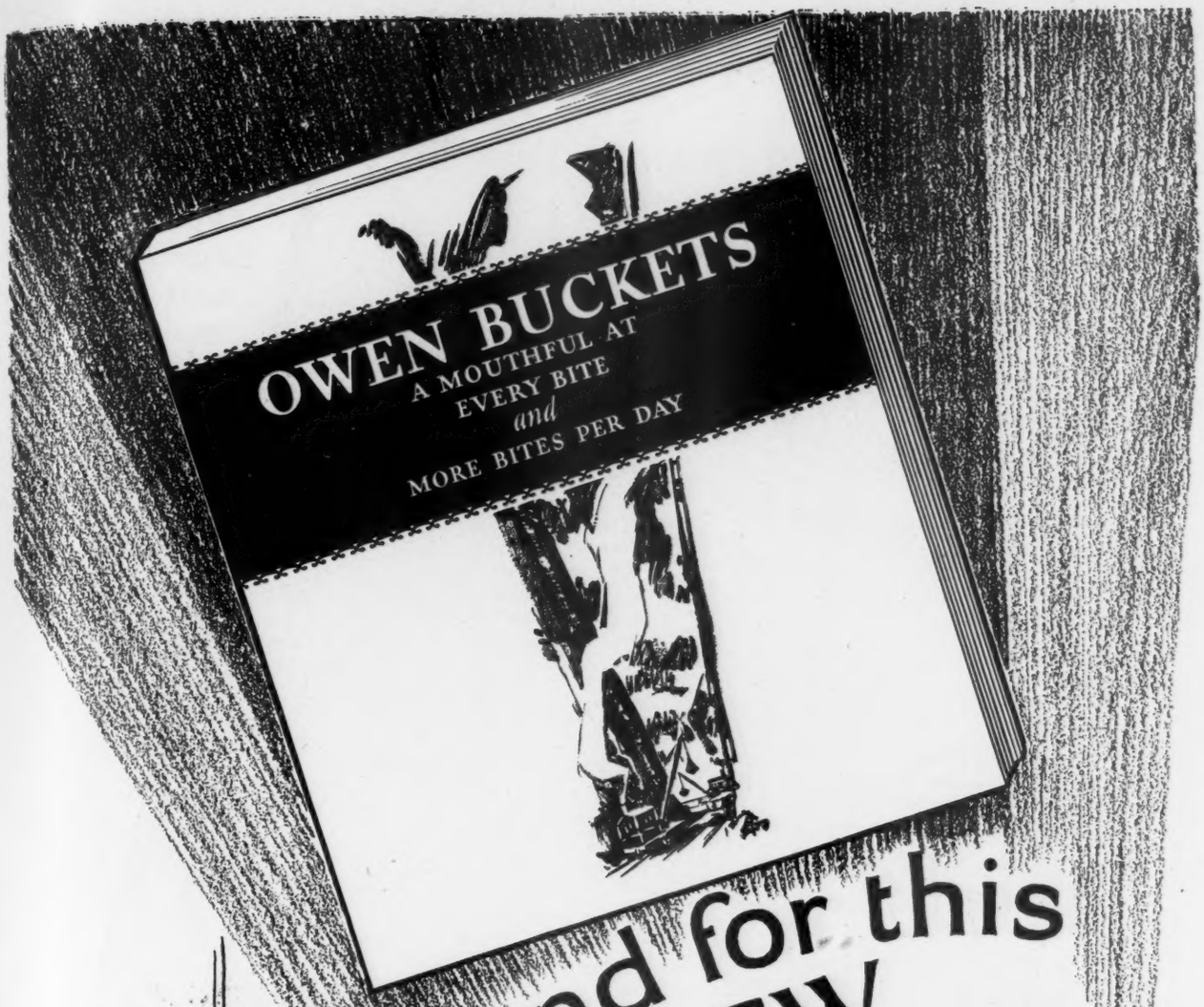
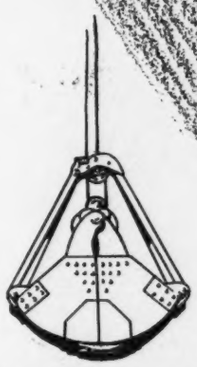


Send for this NEW Owen catalog



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The new Owen Catalog is just off the press . . . and you should have a copy for reference in your files.

It explains and illustrates the complete line of Owen guaranteed buckets. A bucket for every purpose . . . a type for every size and make of crane.

Your copy is ready . . . use the coupon.

THE OWEN BUCKET COMPANY
Cleveland, Ohio

THE OWEN BUCKET CO.,
6021 Breakwater Avenue, Cleveland, Ohio
Please send me a copy of the New OWEN BUCKET CATALOGUE.

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OWEN CLAMSHELL BUCKETS INSURE A BIGGER DAY'S WORK

Owen Buckets

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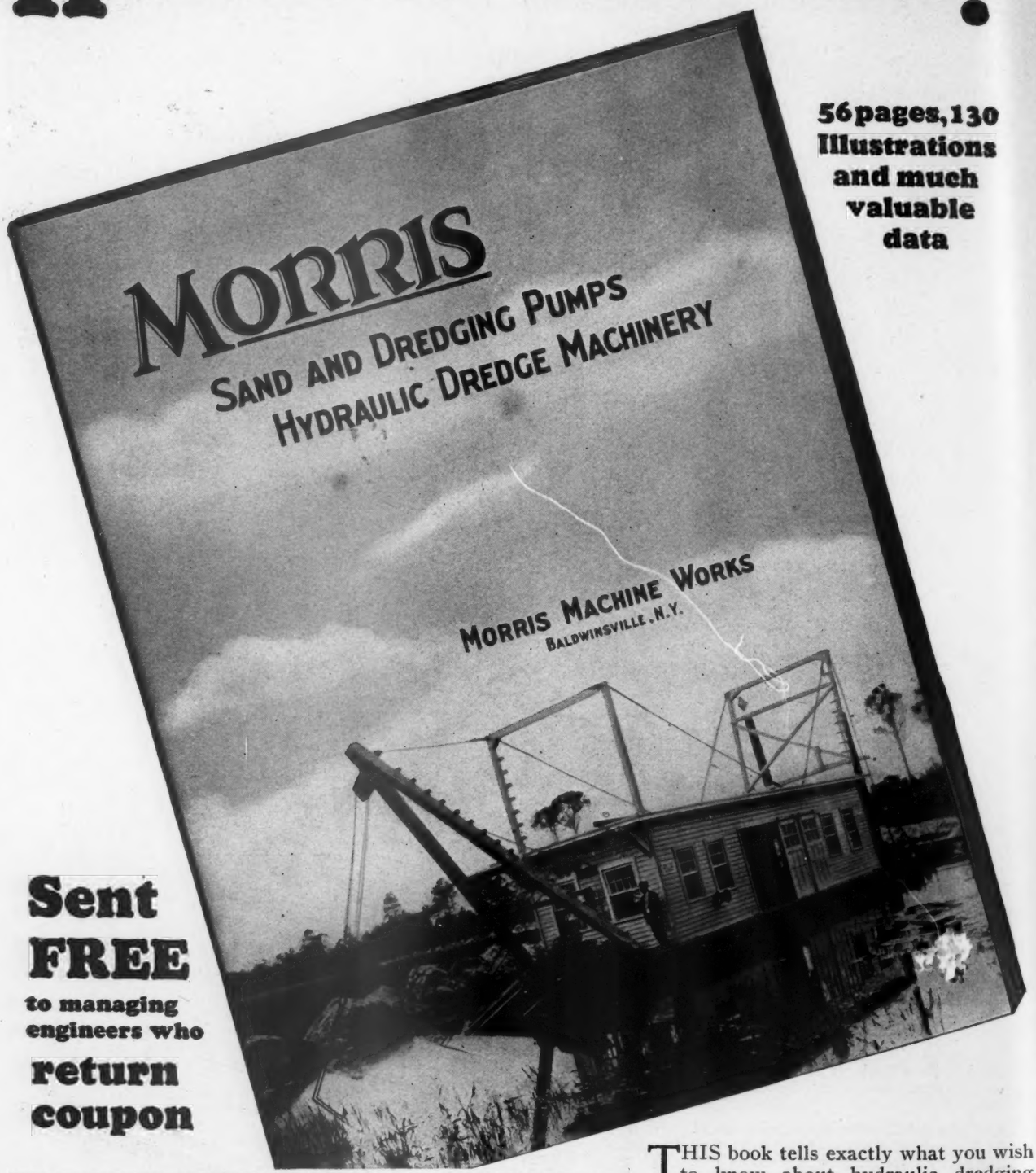

56 pages, 130 Illustrations and much valuable data

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Please send copy of your book on Sand and Dredging Pumps and Hydraulic Dredging Machinery.

Name.....

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Rock Products

THIS book tells exactly what you wish to know about hydraulic dredging methods, hydraulic production of sand and gravel, hydraulic conveying of crushed stone, etc., and describes various types and sizes of pumping equipment that should be used.

If you own or have managing charge of any plant or equipment for these classes of work, you will want this book handy for ready reference and can have a copy free if in returning the coupon you state name of your company and your official position.

"JACKHAMER" DRILLS

for the Quarry

THE R-12 "Jackhamer" is especially valuable as a general utility drill in quarry operations. Its hard hitting gives it sufficient power for bench drilling in the hardest rock. Its light weight and ease of moving make it a favored machine for block-holing.

Rugged construction, sound design, and economy of operation are insured by the Ingersoll-Rand standards of manufacture.

"Jackhamers" for every purpose are available in 5 other sizes, ranging in weight from 23 to 73 pounds.

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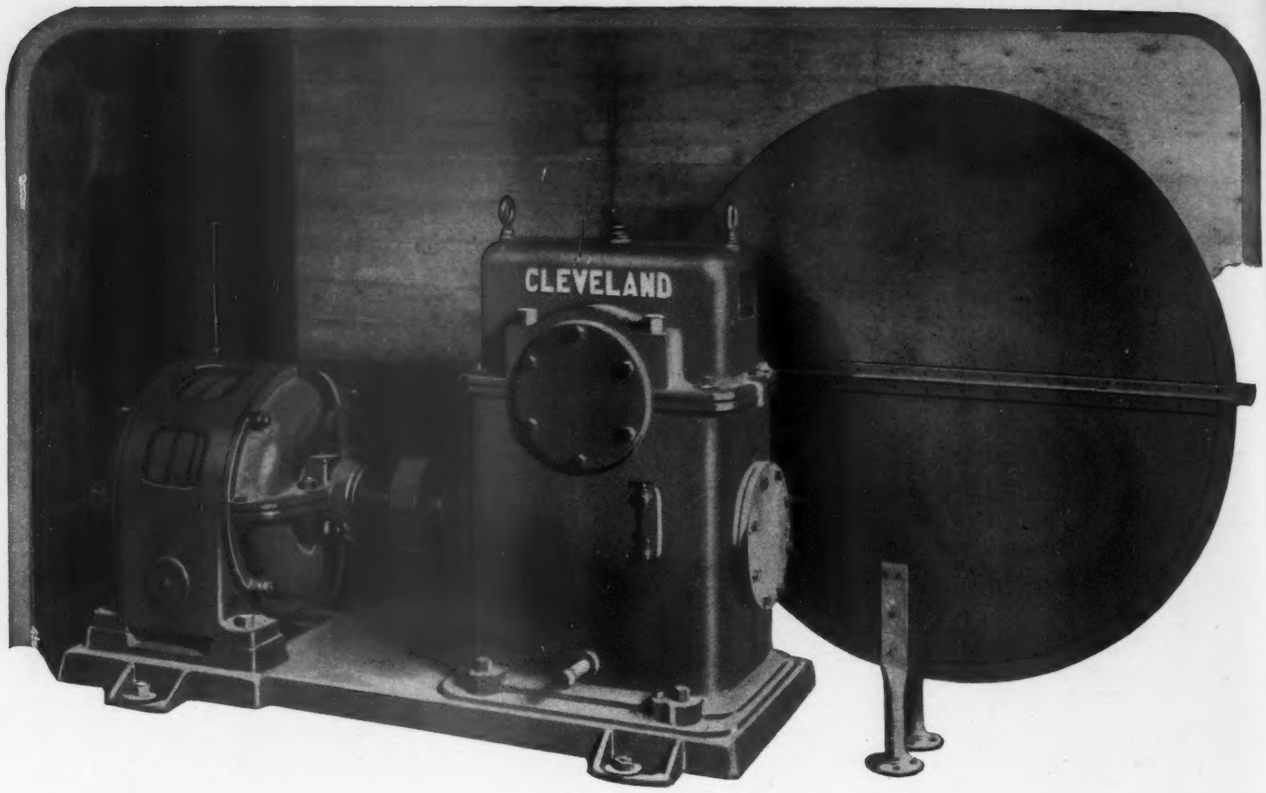
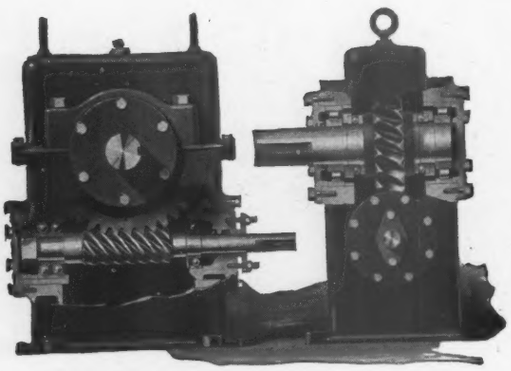


The Cleveland All-Purpose Drive



Although capable of carrying an overhung load the worm gearing in the type AH unit is mounted on anti-friction bearings throughout. The mounting is clearly shown above and assures long life, low maintenance and dependable operation.

As in the agitator drive shown above, it is often advantageous to use a set of spur gears or a chain between the reduction unit and the driven shaft. Under such conditions the standard Cleveland type AH worm gear reduction unit is unexcelled.

The design of the type AH unit permits the mounting of a pinion or sprocket directly on the slow-speed shaft extension. No outboard bearing is necessary. The overall ratio of the drive can be easily and economically changed; the motor and reduction unit can be placed in the most convenient position; the supplementary gearing or chain is long-lived and efficient on account of the low pitch-line speed.

Many users consider the type AH Cleveland to be the highest development of the industrial worm gear reduction unit.

Write for Bulletin No. 106

"Cleveland Worm Gearing—the Ultimate Drive"

CLEVELAND
WORM & GEAR COMPANY

3272 EAST 80th STREET **CLEVELAND, OHIO**

To grind dry materials at Low Cost—

THE BETHLEHEM PULVERIZER meets the requirements of dry grinding processes. It grinds to any degree of fineness up to 325 mesh and delivers the product, without the use of conveyors or elevators, direct to any desired point.

Simplicity and accessibility of moving parts keep maintenance and repair costs down to the minimum. Furthermore, the Bethlehem Pulverizer operates with extremely low power consumption, and in addition is capable of very high output.

A copy of Catalog J will gladly be sent on request.

BETHLEHEM STEEL COMPANY
General Offices: BETHLEHEM, PA.

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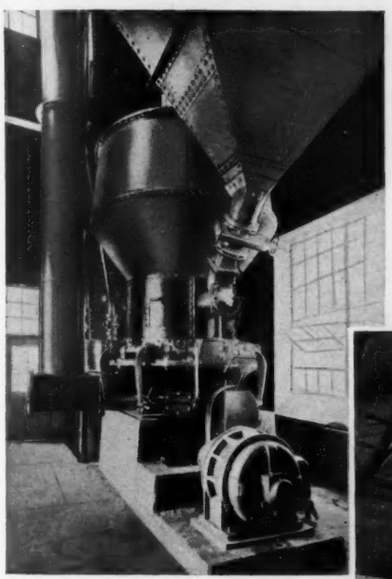
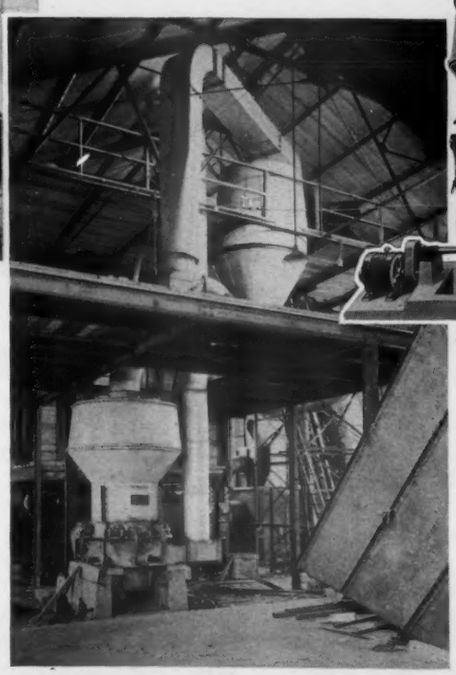
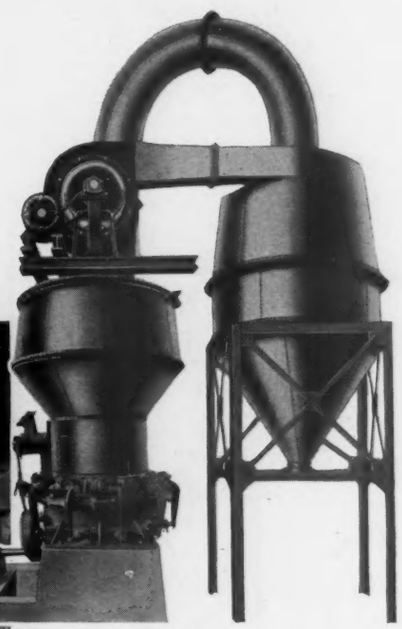


Above:
Bethlehem Pulverizer installed in an industrial plant

Below:
Bethlehem Pulverizer installed in a rock products plant





Above:
The complete Bethlehem Pulverizer Unit, showing the Pulverizer with fan mounted over top and Cyclone Collector at right

BETHLEHEM PULVERIZER

THE GUIDE TO LOWER HOISTING COSTS

One Minute An Envelope And a Stamp

—*virtually take you to 34 typical hoisting jobs*

The Novo Hoisting Handbook was written especially for contractors who want to get everything possible out of their hoisting units.

It is full of interesting pictures, facts and information on practically every type of hoisting work. This data is a compilation of hundreds of jobs in every section of the country. Thirty-four typical hoisting jobs are shown.

Fill out and send the coupon today—it takes only a minute, an envelope and a stamp. You'll find it a worthwhile investment. And no obligation.

NOVO ENGINE COMPANY, 250 Porter Street, Lansing, Mich.

CLARENCE E. BEMENT, Vice-Pres. & Gen. Mgr. Service, parts and sales in over 60 cities

NOVO ENGINE CO.,
250 Porter Street, Lansing, Mich.

Without obligating me in any way, please send a copy of the *Novo Hoisting Handbook.*

Name .....

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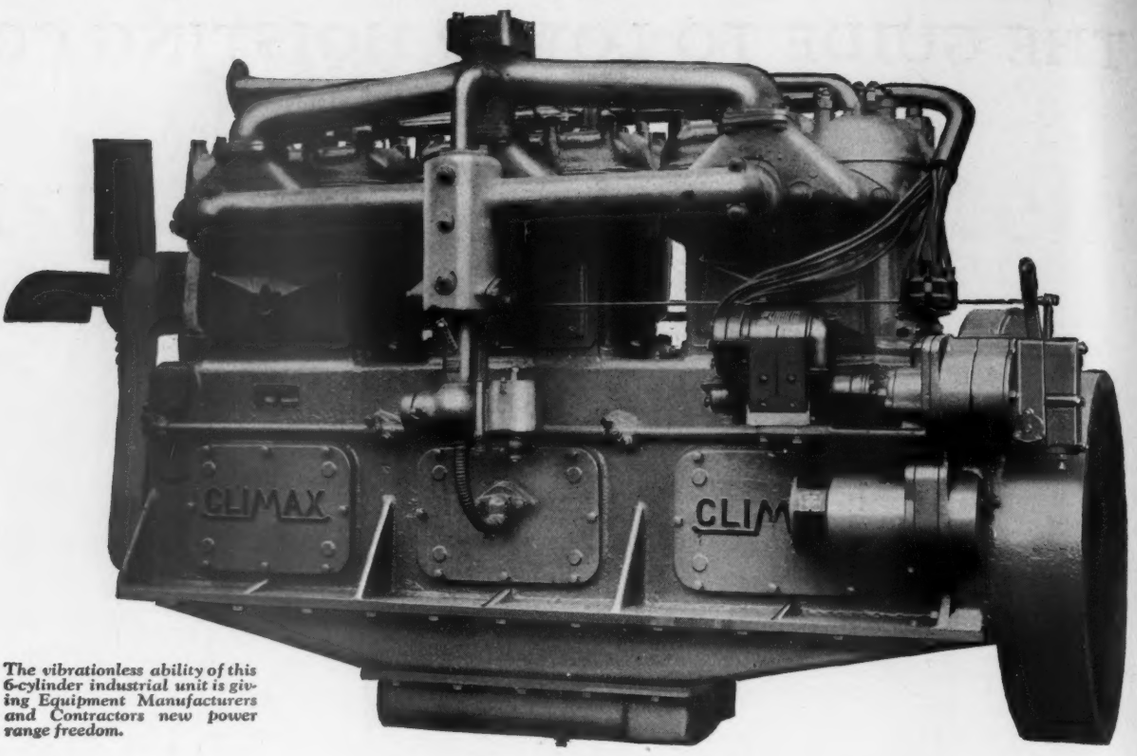
I am interested in a hoist for .....

NOVO

Hoists from 300 to 10,000 Pounds

Also Engines and Pumps



The vibrationless ability of this 6-cylinder industrial unit is giving Equipment Manufacturers and Contractors new power range freedom.

Overcoming Power Variations —Under Any Load

Are you getting the most out of the heart of your equipment under all conditions? The new automatic spark control on Climax engines overcomes the power variations common to "hit or miss" spark setting. This new spark control operates from the suction in the intake manifold. And since the variation in pressure in the intake manifold is absolutely proportional to the load on the engine, the ignition is always timed correctly no matter how the power load varies. As a result, Climax engines have plus-ability under all conditions.

Maximum Power Under Any Load for

Shovels
Other Excavating Machinery
Road Rollers
Tractors
Farm Machinery
Industrial Locomotives
Locomotive Cranes
Portable Saw Mills
Compressors
Pumps
Generators
Rock Crushers
Hoists

CLIMAX ENGINEERING COMPANY
78 West 18th Ave. :: Clinton, Iowa

CLIMAX Trade Mark Reg. U. S. Pat. Office

Robins CATARACT Grizzly showing spacer collars between discs.

This *Adjustable* Grizzly Means a More Flexible Flowsheet

SPEAKING generally, scalping or coarse sizing in any plant would be under better control if the Robins CATARACT Grizzly were installed. Because it is the ***adjustable*** Grizzly.

By adjustable, we mean that with every unit the size of openings can be made ¼ or ½ inch larger. For instance—

1 inch openings can be made 1¼ or 1½ inch
2½ inch openings can be made 2¾ or 3 inch
4¾ inch openings can be made 5 or 5¼ inch

. . . and so on.

These changes can be easily made by merely inserting "spacer collars" between existing discs. New discs are unnecessary.

Thus, in addition to scalping or screening large tonnages in relatively little space and to reducing by 60 to 75% the power required by rotaries, there is the advantage of flexibility in sizing.

And flexibility permits desired changes in the flowsheet.

For full details write to our nearest office.

Robins Equipment for Crushing and Screening Plants

Conveyors and Elevators
Grizzlies
Shaking Screens
Vibrating Screens
Feeders
Trippers
Gates

ROBINS CONVEYING BELT CO.

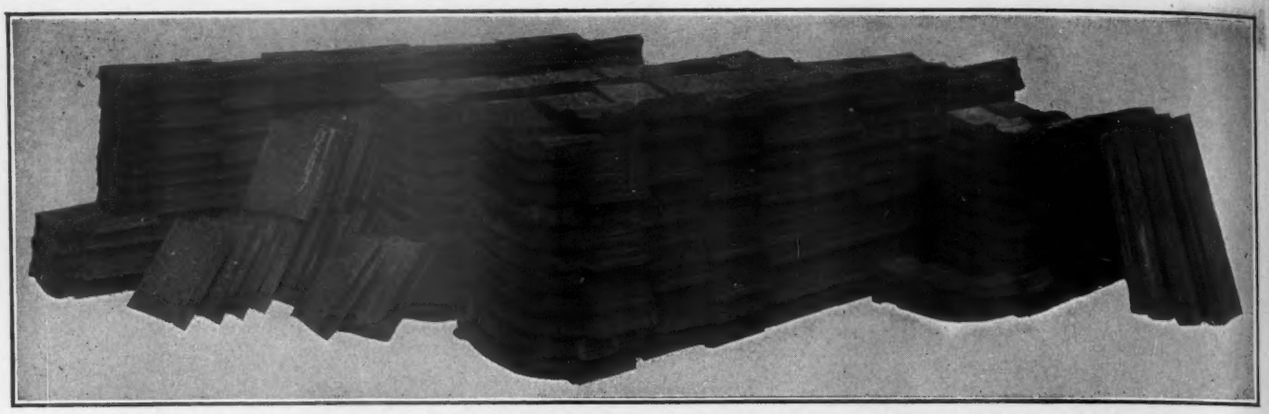
15 Park Row, New York

Chicago Boston Philadelphia Pittsburgh Los Angeles

Agents in other principal cities

Conveying and Elevating Equipment
Sizing and Screening Equipment
Stocking and Reclaiming Systems

MATERIAL HANDLING ROBINS EQUIPMENT



Chilled-Iron Tube-Mill Lining Plates *of* Unusual Wear-Resisting Qualities

The wear-resisting qualities of Fuller Lehigh Chilled-Iron Tube-Mill Linings have resulted in their widespread use throughout America and even in foreign countries. The fact that many of the largest mills after experimenting with other linings have adopted Fuller Lehigh Chilled-Iron is direct proof of their time and money-saving features.

Durability

Fuller Lehigh Tube-Mill Lining Plates are made from carefully selected mixtures of charcoal iron of the highest quality. The wearing surfaces are chilled to a depth which long experience has shown to be best suited for the purpose. This chilled-iron portion is backed by a strong soft-iron—a combination which assures strength and wear-resisting qualities of an exceptionally high degree.

Ease of Installation

Fuller Lehigh Tube-Mill Lining Plates can be handled with ease by one man. No bolts to tighten—simply drive home the round pins after each circle of plates is in place. A projection drawing shows where each plate goes.

Cascade Action of Load

The ribs and cup-shaped depressions accelerate the tumbling action in the mill and prevent sliding of the load, resulting in greater tonnage ground in less time.

Increased Capacity

This efficiency of operation is augmented in many cases by the fact that the cubic space occupied by Fuller Lehigh Tube-Mill Linings is less than that occupied by many other linings, thereby increasing the cubic content of the mill. This permits a proportionate increase in the charge of the grinding element, promotes cascading of the load and consequently increases the mill output.

If you want a tube-mill lining—or other part—of unusually long wearing qualities, use Fuller Lehigh Chilled-Iron Castings.

Fuller Lehigh Products

Chilled-Iron Castings

Lining Plates for Tube Mills
Sprockets
Traction Wheels
Fuller Mill Balls and Parts
Roll Heads
Crusher Repairs

Pulverized-Coal Equipment

Complete Pulverized-Coal Equipment
Pulverizing Mills
Air-Transport System for Pulverized Coal
Dryers—Rotary and Vertical
Feeders
Burners

Water-Cooled Furnace Walls

FULLER LEHIGH COMPANY

A Babcock & Wilcox Organization

Fullerton, Penna.

519

In Ravelly Ground

You will find the Gardner-Denver Model 11 a revelation when drilling in the meanest kind of ground. Powerful rotation and a continuous stream of air through the hollow drill steel, keep the bit cutting virgin ground instead of pulverizing its own cuttings. The strong current of air keeps the hole clean so that the steel can be easily withdrawn.

As a plugging drill the Model 11 has become most favorably known for its speed and reduced vibration. There is a Gardner-Denver representative near you who would be glad to bring a Model 11 to your quarry and submit it to test under your worst drilling conditions. Write us for bulletin and price on this new drill.

A Complete Line of
Clay Diggers
Paving Breakers
Drifting Drills
Stoping Drills
Sinking Drills
Plugging Drills
Drill Steel Sharpeners
Air Hoists
Line Oilers

A Complete Line of
Air Compressors
Horizontal and Vertical
Single and Two-Stage
Water and Air Cooled
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Garage Compressors
Duplex Steam Pumps
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GARDNER-DENVER COMPANY
QUINCY, ILL. DENVER, COLO.
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GARDNER-DENVER

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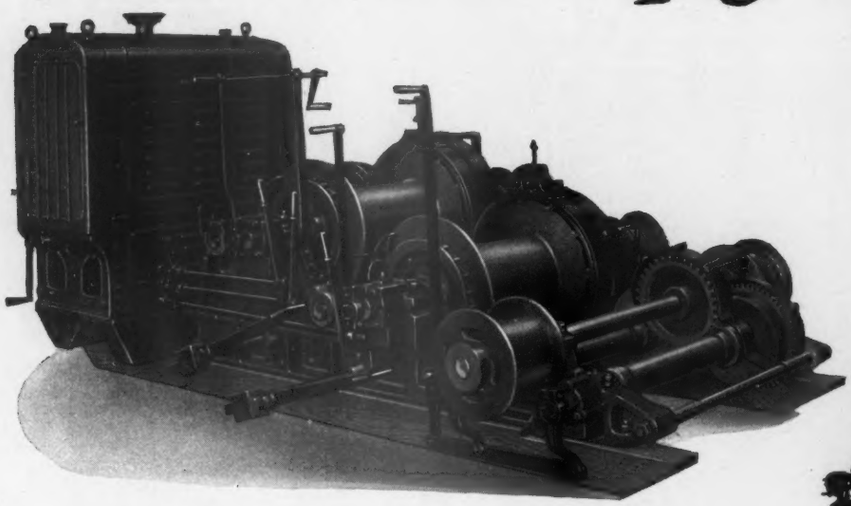
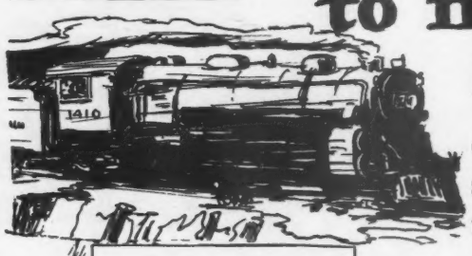
POWER for the up-grade



SPEED to maintain schedules



POWER - - - SPEED! These are two of the important factors that qualify a locomotive to haul the crack transcontinental flyer. *Power*--to start the heavy train with silky smoothness--to negotiate the heavy grades. *Speed*--to maintain the schedule and insure "on time" arrival at the distant terminal.

TRADE MARK MUNDY ESTABLISHED 1869

To Equipment Distributors

The New Patent Three-Speed Hoist is fully protected by patents in the United States and Canada.

Some open exclusive sales territory is now available.

A freight engine—though tremendously powerful—has not the speed that would put the crack flyer there on time. Likewise the single-speed hoist. Powerful 'tis true—but woefully lacking in the speed so necessary for efficient all-around operation.

The Mundy Hoist is the last word in versatility. Three speeds are available. Any one of them at the instant command of the operator.

Think what that means in speeding up your hoisting operations. In saving money by getting the job done quicker There's a slow speed for *power*—where the going is heavy. An intermediate speed for loads less heavy—and a third speed to maintain hoisting schedules.

Ask for descriptive bulletins.

The Mundy Sales Corporation

Distributors for the J. S. Mundy Hoisting Engine Co

30 Church St., New York

Agents in Principal Cities

MUNDY HOISTS

The Hoist With The Asbestall Frictions

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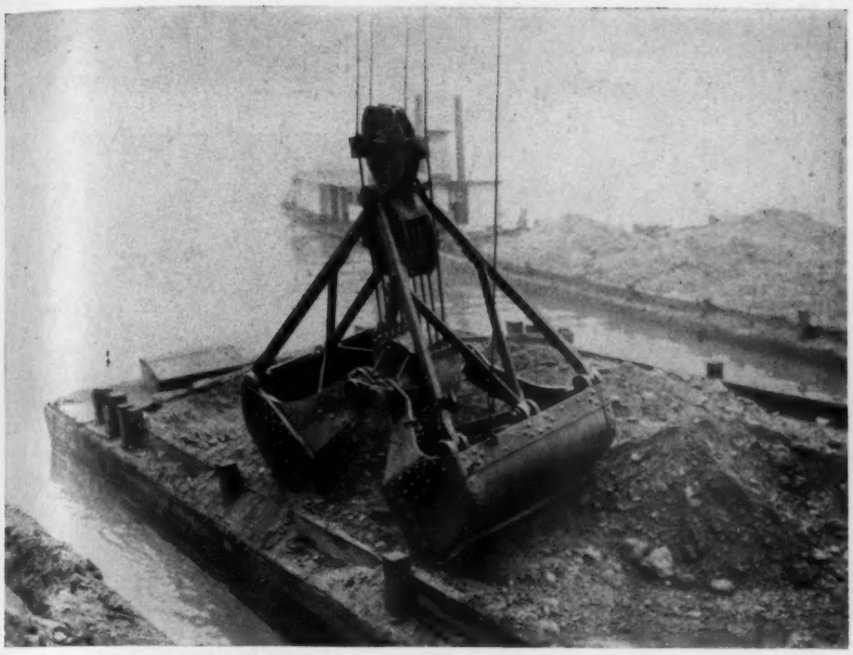


A busy bucket at the barges

THIS huge Hayward Clam Shell is a busy bucket unloading barges at the Tennessee River plant of the Dixie Sand and Gravel Co. of the Pennsylvania Dixie Cement Corporation, Chattanooga. It digs powerfully into sand, gravel and stone, and comes up with loads of 3 cu. yds.—and more.

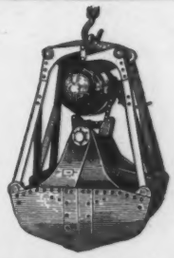
Not only does this Hayward get the unloading done quickly, but it cleans up the deck so that shovel work is reduced to very little indeed.

Powerful digging, as well as speedy discharge, is typical of the entire Hayward line. Our buckets are fitted to your needs and to your operating equipment; Hayward engineers will gladly advise you in the selection of the proper type for your job.

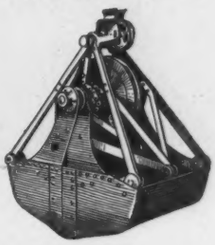
THE HAYWARD COMPANY
200-204 Fulton Street New York, N. Y.

Builders of Clam Shell Drag Line, Orange Peel and Electric Motor Buckets; Dredging, Excavating, and Coal Handling Machinery; Automatic Take-Up Reels; Counterweight Drums.

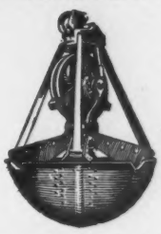
Hayward Buckets



Electric Motor Buckets

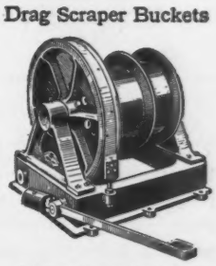


Clam Shell Buckets

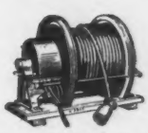


Orange Peel Buckets

Drag Scraper Buckets



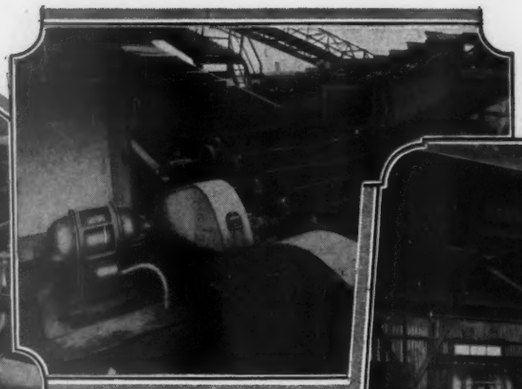
Counterweight Drums



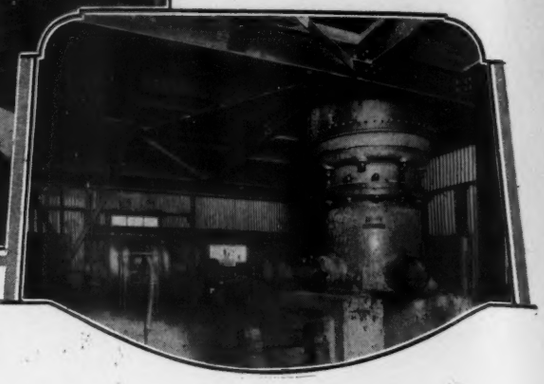
Automatic Take-Up Reels

Skid Excavators and Dredges

G-E 60-hp., 1435-r.p.m. motor direct-connected to centrifugal pump



10-hp., 720-r. p. m. G-E motor driving sand separator which handles approximately 200 tons per hour



G-E 25-hp., 480-r.p.m. motor direct-connected to gyratory crusher

15-hp., 720-r.p.m. G-E motor driving set of three conical screens which handle 220 tons per hour

Handling Sand and Gravel with G-E Equipment

In the sand and gravel industry—as in cement, stone, and brick plants—operators are depending more and more on G-E Motorized Power.

The plant of the Buffalo Gravel Corporation is unique. Raw material is dredged from the bottom of Lake Erie and conveyed in boats and barges to the plant. This unusual method of transporting the supply of sand and gravel, combined with stringent space limitations, gives rise to special problems in handling. G-E equipment has contributed greatly to their satisfactory solution.

The severe service of sand and gravel plants makes only the best of drive suitable. The vibration and varying loads of a crusher, the overloads of a conveyor, as well as adverse atmospheric conditions, demand motors of proved design, construction, and performance. G-E motors and control have an enviable reputation in the rock products industries.

G-E engineers have made an intensive study of sand and gravel plants; they can advise you concerning the difficulties you encounter. Your nearest G-E office will render any service you may require.

When you specify G-E Motorized Power, G-E rock products specialists study your electric drive problem, select from the complete G-E line the motor or motors best suited, choose the necessary control equipment, and then see that the installation is properly made and serviced. This complete service is available through your nearest G-E office.

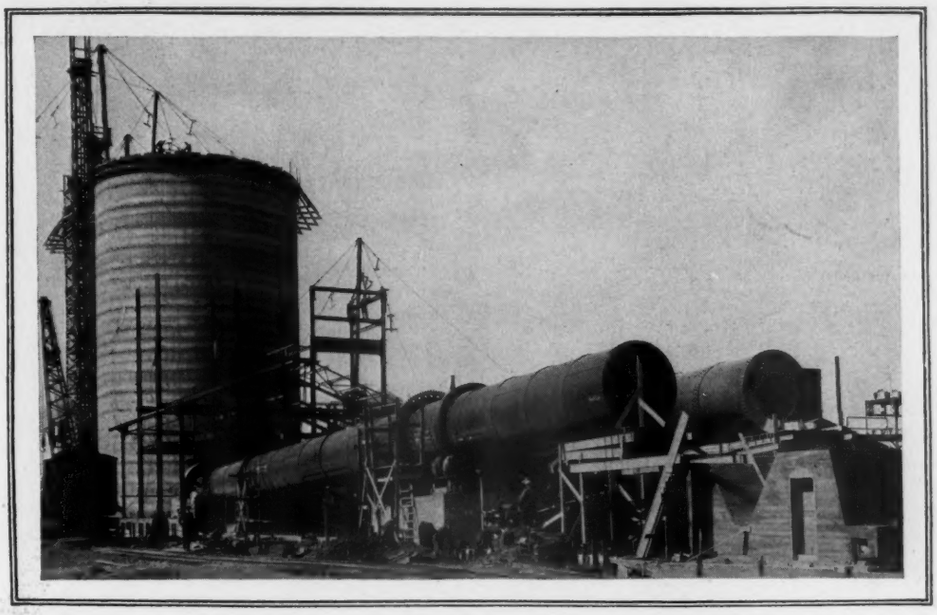
Motorized Power
—fitted to every need

200-149

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Building In Kilns For "Life" And Lower Production Costs



The building above is barely under way, but Manitowoc Kilns are being installed — put in for "life" and lower production costs.

It is another typical Manitowoc Kiln installation. Big, sturdy kilns that will give "liberal" production at lowest operating costs.

Manitowoc Kilns are so commonly used because they are highly reputed for long life and economy of operation. They embody the proper design — painstaking construction — the best of materials — and effect substantial savings.

Send for Cement Bulletin — it completely pictures and describes Manitowoc Cement Mill Equipment. It costs you nothing but the asking. Write for it today.

MANITOWOC ENGINEERING WORKS
MANITOWOC, WISCONSIN

Cement Mill Equipment

- Rotary Kilns
- Rotary Coolers
- Rotary Dryers
- Minogue Slurry Agitators
- Tube Mills
- Slugs for Tube Mill Grinding Media
- Minogue Flue Dust Feeders

MANITOWOC

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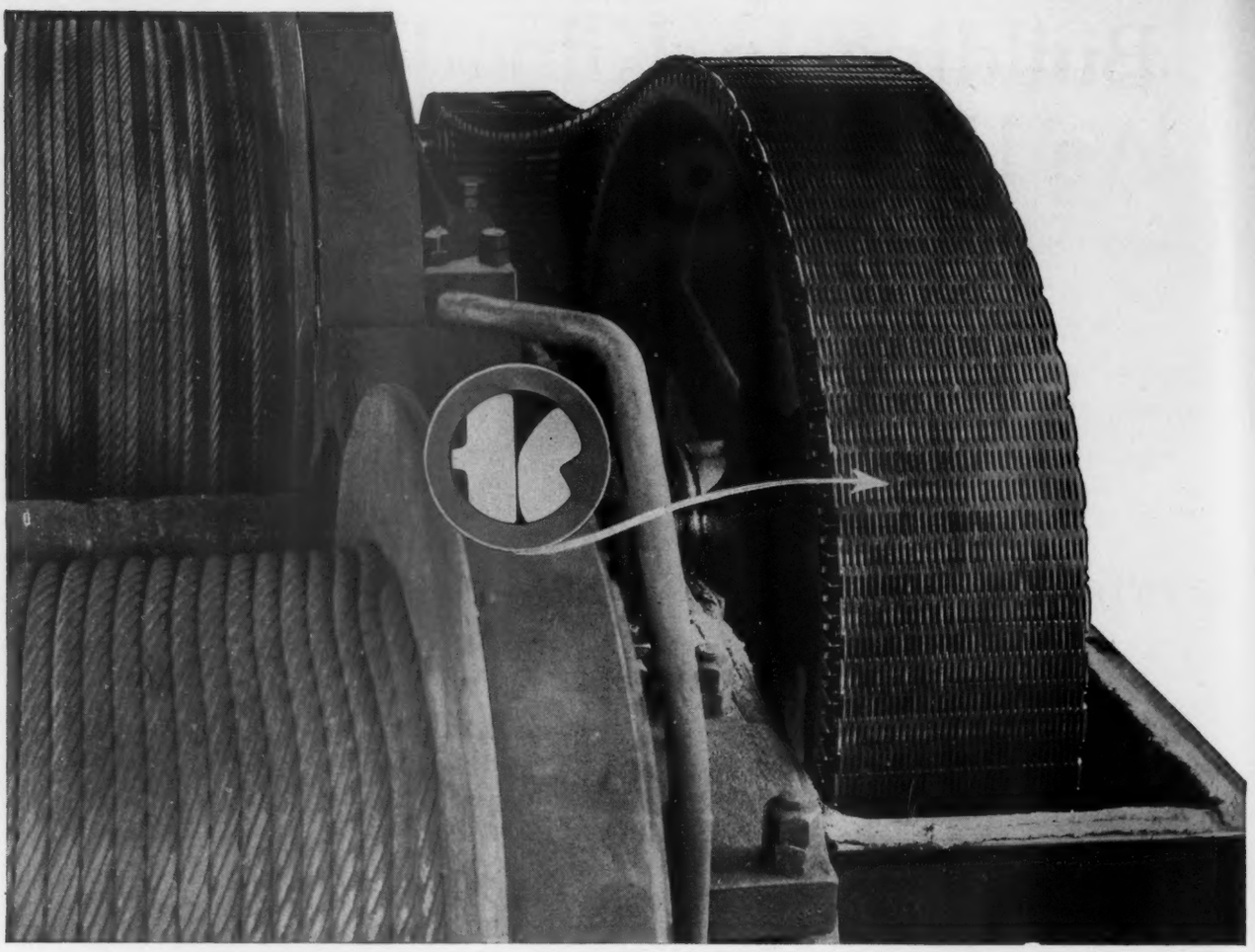

A Man-sized Job—

FILLING in and leveling granulated slag is hard work. It requires rugged, heavy duty machinery to stand up under the strain. This Beaumont 1½ yard hoist operates the dragline scraper that is doing this work. It's driven from motor by a 75 H.P. Morse Silent Chain. That's one reason for the dependability of this equipment.

Morse Drives are extensively used on all types of machinery. They are positive, flexible, 98.6% efficient. Ideal for short centers.

Address the nearest Morse Transmission Engineer for help in your power drive problems.

MORSE CHAIN CO., ITHACA, N. Y., U. S. A.

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MORSE SILENT CHAIN DRIVES

When writing advertisers, please mention ROCK PRODUCTS

Ungoverned power destroys even the most rugged machine

SPEARWELL MOGUL LOADERS

Like hundreds of other power equipment units, are protected by PIERCE GOVERNORS, to assure the buyer the greatest service and economy.

Get More Work at Less Cost from your Power Engines—

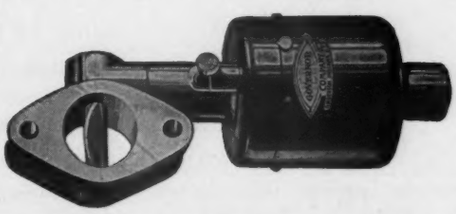
PIERCE GOVERNORS keep power engines on the job by protecting every moving part against destructive racing and stalling when power loads are suddenly applied or released.

No matter how wide nor how sudden the load variation, the Pierce-equipped engine responds to the load with a steady, uniform flow of power.

This protection means 200% to 400% longer life for your power engines and guards every moving part against excess wear. It means higher efficiency, lower operating and fuel costs and fewer repair bills.

By eliminating wasted power, PIERCE GOVERNORS assure more work from every power engine at a lower cost.

Send for booklet No. 120 today. Learn how you can cut your power operating costs with a dependable PIERCE GOVERNOR.



PIERCE GOVERNORS are simple, rugged and thoroughly dependable. Will last a lifetime. Liberal guarantee.

PIERCE GOVERNOR CO., *Anderson, Ind.*

World's Largest Governor Builders

Pierce Governors *for Automatic Speed Control*

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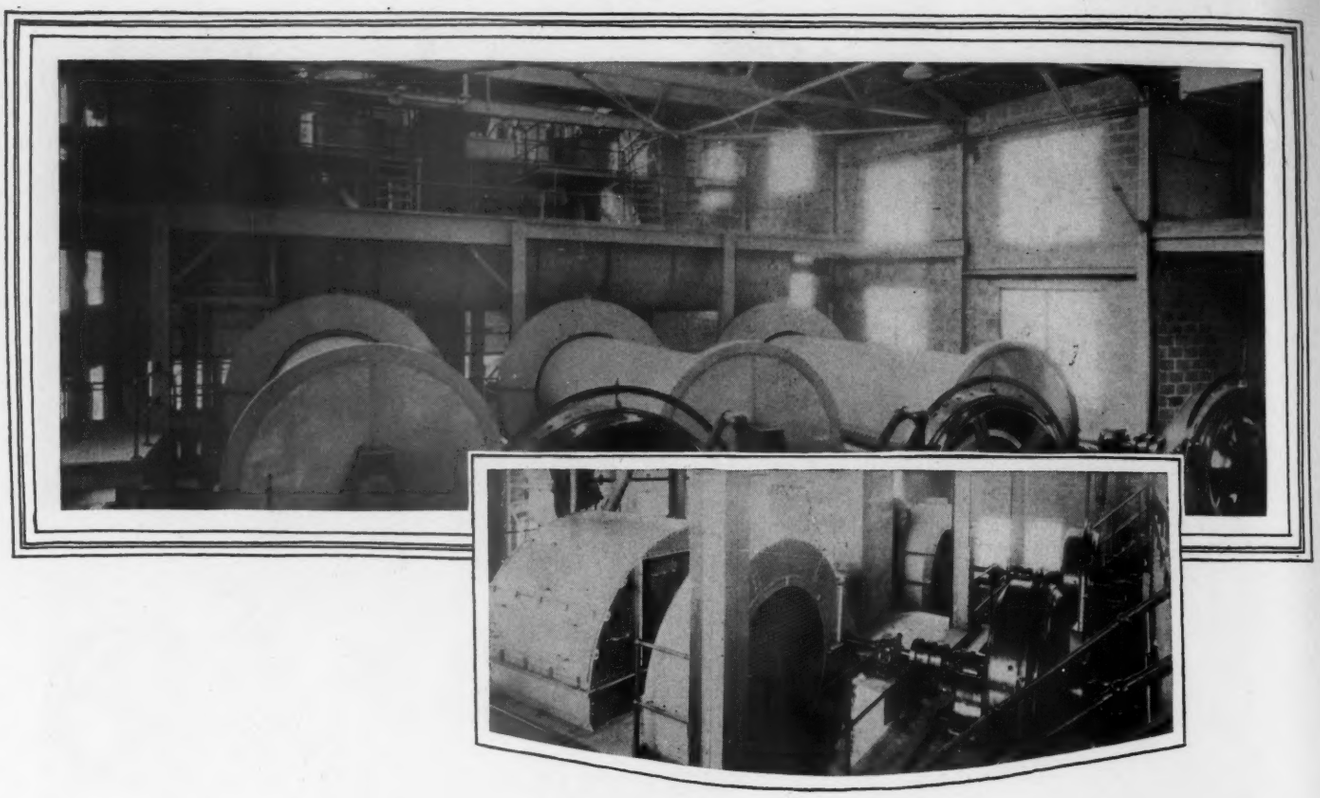

LARGE WET UNITS

Kominuter and Tubemill Batteries combine flexibility of operation, uniform fineness of product, large capacity per horse power, low operating and maintenance costs.

The WET KOMINUTER takes run of crusher or hammer mill material, reducing it to a uniform size ideal for tubemill feed.

The TUBEMILL takes kominuter product, reducing it to a uniform fineness, which in the cement industry is so essential for good kiln feed.

The greatest wear on the Kominuter and Tubemill falls on cheap and easily accessible parts. In addition, they are not liable to damage from scrap iron, steel or other foreign materials.

Both Kominuter and Tubemill embody the benefit of experience gained from constant contact with grinding problems over a period of thirty years. The Kominuter and Tubemill form an ideal combination for the grinding and pulverizing of all refractory materials.

F. L. Smidth & Co., Inc.

ENGINEERS

50 Church Street — **Designers and Equippers of Cement Making Factories** — **NEW YORK**

Factory, Foundry and Laboratory—Elizabeth, N. J.

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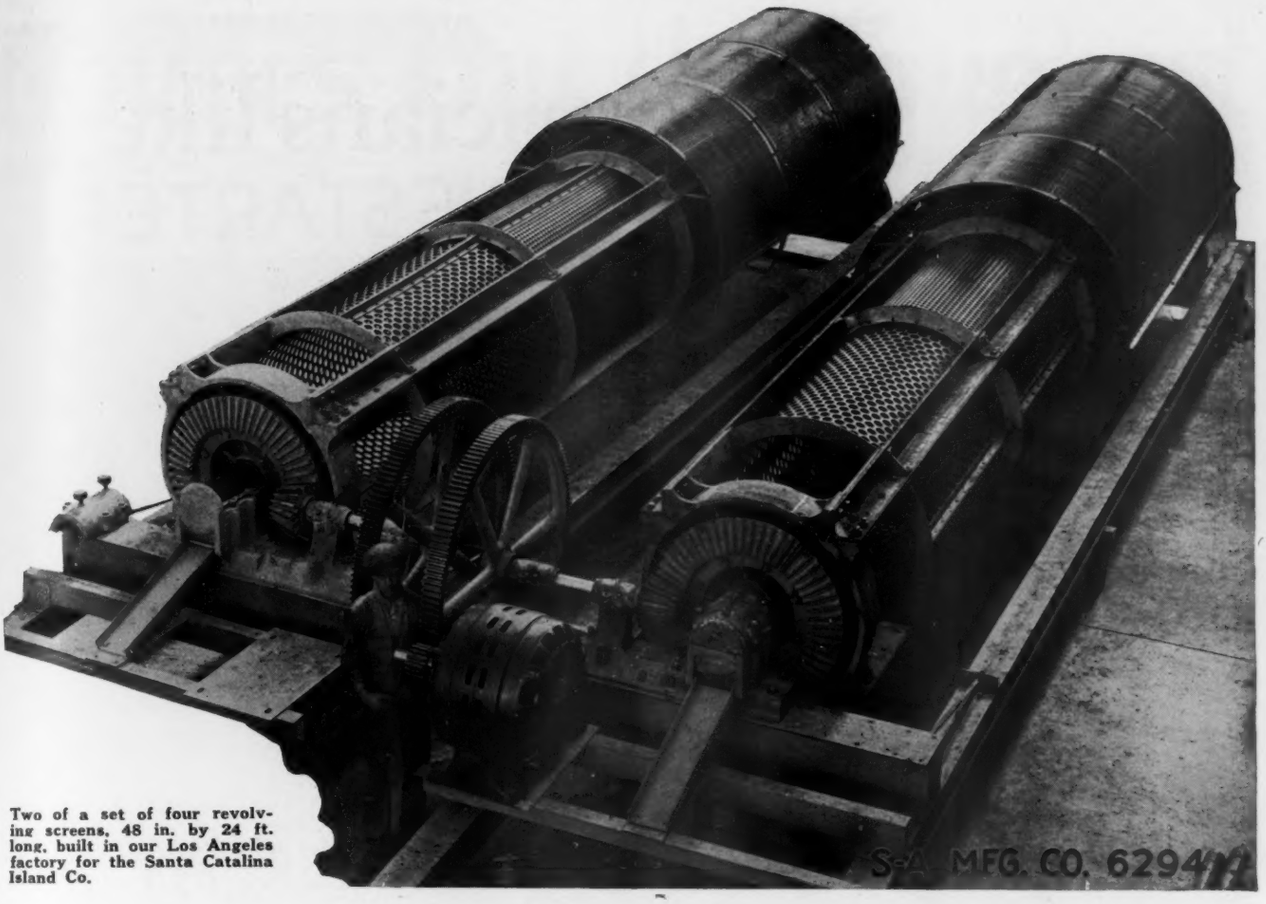

Two of a set of four revolving screens, 48 in. by 24 ft. long, built in our Los Angeles factory for the Santa Catalina Island Co.

REVOLVING SCREENS

Designing and constructing large revolving screens is a job where actual field experience is necessary.

The continuous rotation of the heavy screen barrels with the aggregate thundering into the drums from the loading spouts would spell failure to any but the best and most massive screens.

The conditions require correct design, rugged strength and the massive proportions always to be found in S-A Screens.

S-A screen barrels with their heavy cast ring ends must be strongly tied and braced with structural steel members and cast segments securely fastened in place. Special provision is always made to facilitate the renewal of screen plates.

S-A Engineers design and build all classes of screens—rotating, shaking, reciprocating, gravity and vibrating

Write the nearest S-A Branch or Factory for data and prices.

DESIGNERS AND BUILDERS OF LABOR SAVING MATERIAL HANDLING MACHINERY

STEPHENS-ADAMSON MFG. CO. Main Offices, Aurora, Ill.
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AURORA S-A MFG. CO ILLINOIS

STEPHENS-ADAMSON

PLANTS: AURORA, ILLINOIS ~ LOS ANGELES, CALIFORNIA ~ BELLEVILLE, ONTARIO

Gouges Out the Toughest

CLAY is tough but rock is tougher. Ability to dig in and tear loose in hard, tough going, is one of the first requirements of a power shovel.

The exceptionally well designed, strong, all-manganese steel dipper, standard equipment on all Link-Belt Shovels, is built to endure the terrific impact due to the powerful push of the Link-Belt crowding mechanism.

When you examine the Link-Belt Shovel part by part, you find one of the reasons why a Link-Belt Shovel is so easy to operate. Send for Bulletin No. B-10.

3349

LINK-BELT COMPANY

Leading Manufacturers of Elevating, Conveying and Power Transmission Machinery

CHICAGO, 300 W. Pershing Road — Offices in Principal Cities

LINK-BELT SHOVEL

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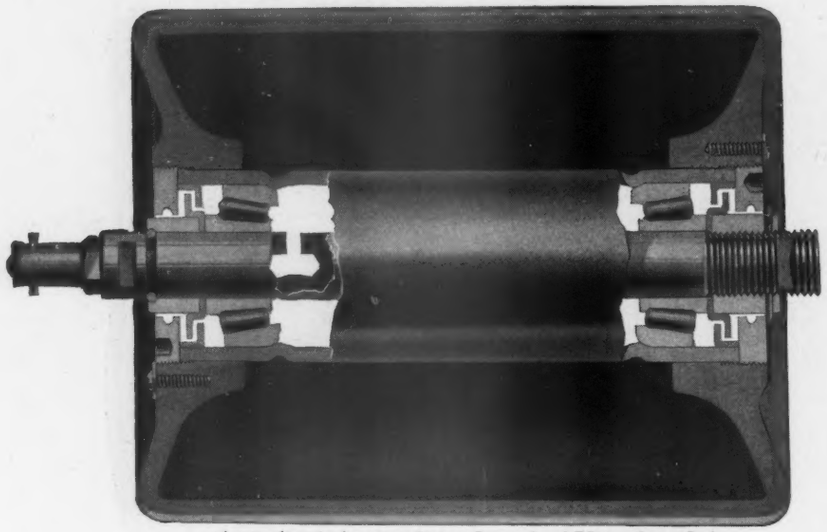
Dust Stays Out Grease Stays In—

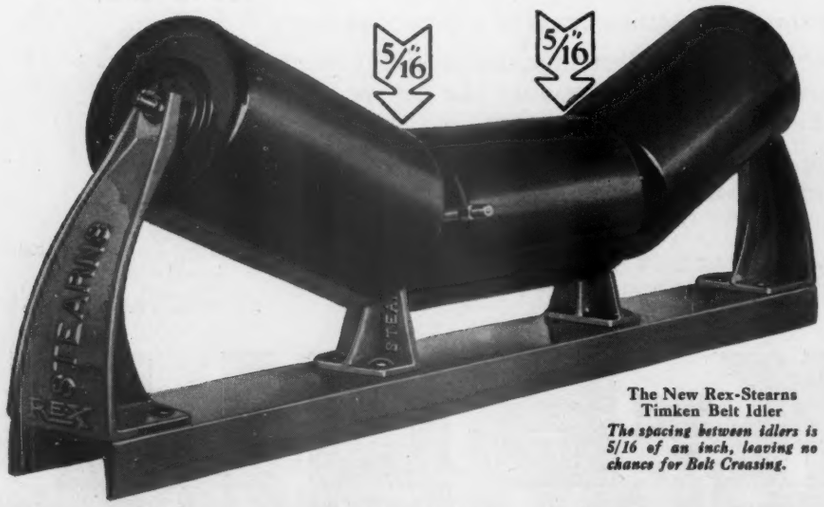


Showing (in white) the Rex-Stearns Patented and Efficient Grease Seal

They Cost Less To Run

Plain Bearings Idlers are passing out. They cost less at first, but more in the end. They use up horse power, but more important—they use up man power for upkeep, lubrication and maintenance. Then wear out rapidly—dirt gets into the bearings and hastens the process.

Rex-Stearns Idlers are replacing them on new and old installations because—"Dust Stays Out—Grease Stays In" and "They Cost Less to Run." More of the story is told in the side column—our folder "Dust Stays Out—Grease Stays In" tells still more about it.



The New Rex-Stearns Timken Belt Idler
The spacing between idlers is 5/16 of an inch, leaving no chance for Belt Creasing.

REX-STEARNS BELT CONVEYORS—IDLERS

Reg. U. S. Pat. Off.

In Mine, Pit *and* Quarry

REX STEARNS

One Piece Pulley Shell—on both Pressed Steel and Chilled Face Cast Iron Idlers.

Timken Roller Bearings on Both Types

The Rex-Stearns Grease Reservoir

Makes lubrication necessary only every six months under average working conditions.

The Labyrinth Grease Seal

Keeps grease in the bearings and keeps grinding dirt and dust out.

The Pulleys are Separately Mounted

Each Idler can be removed independently of the others.

The Pressed Steel Type

Permits of savings on every other item of belt conveyor cost (the folder tells why).

The Chilled Face Cast Iron Idler

For abrasive service is the most wear resisting idler on the market today.

Send for the folder, "Dust Stays Out—Grease Stays In."

The Stearns Conveyor Company
982 E. 200th St. & St. Clair Ave. Cleveland, O.
Owned by
Chain Belt Company
749 PARK STREET, MILWAUKEE, WIS.

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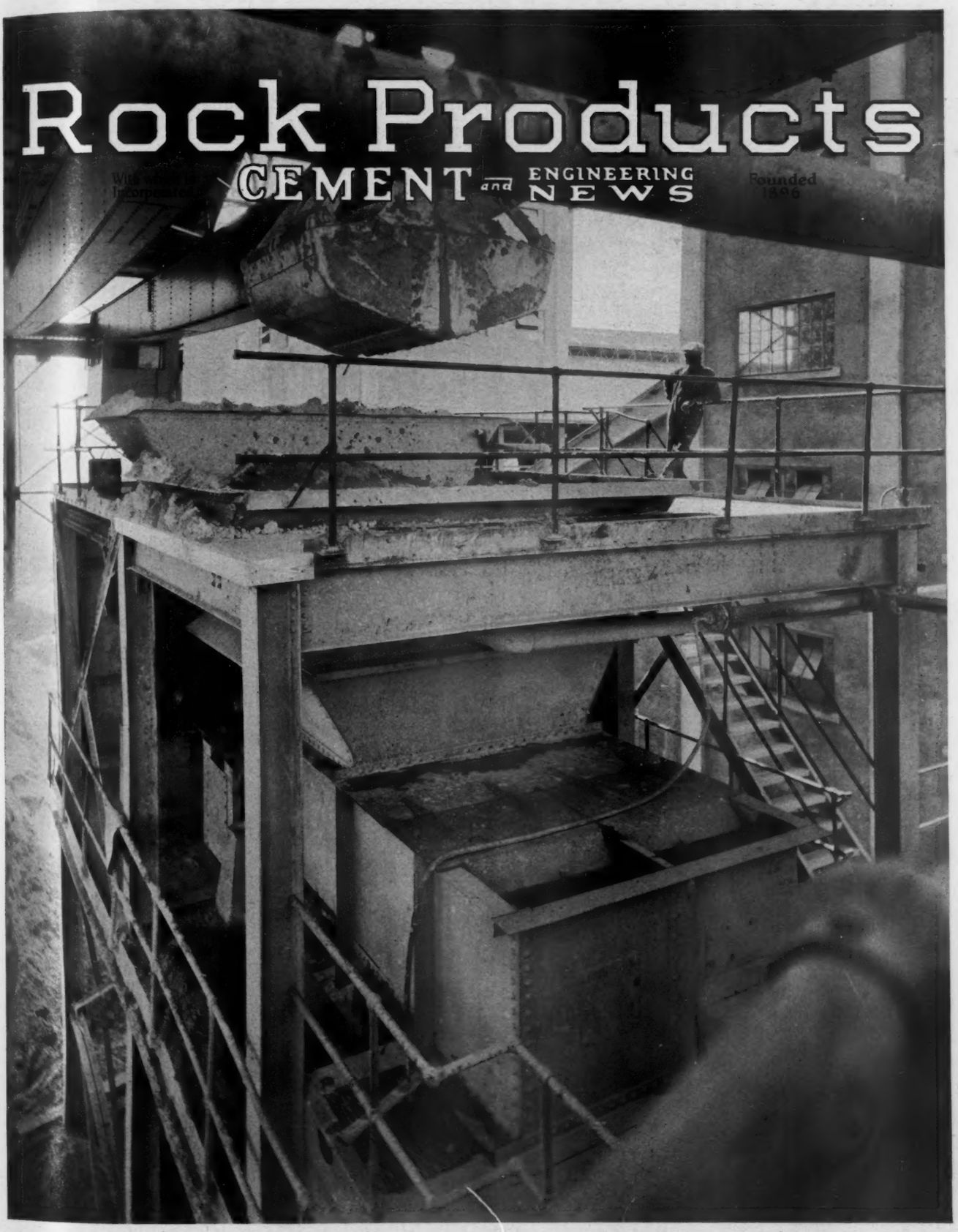
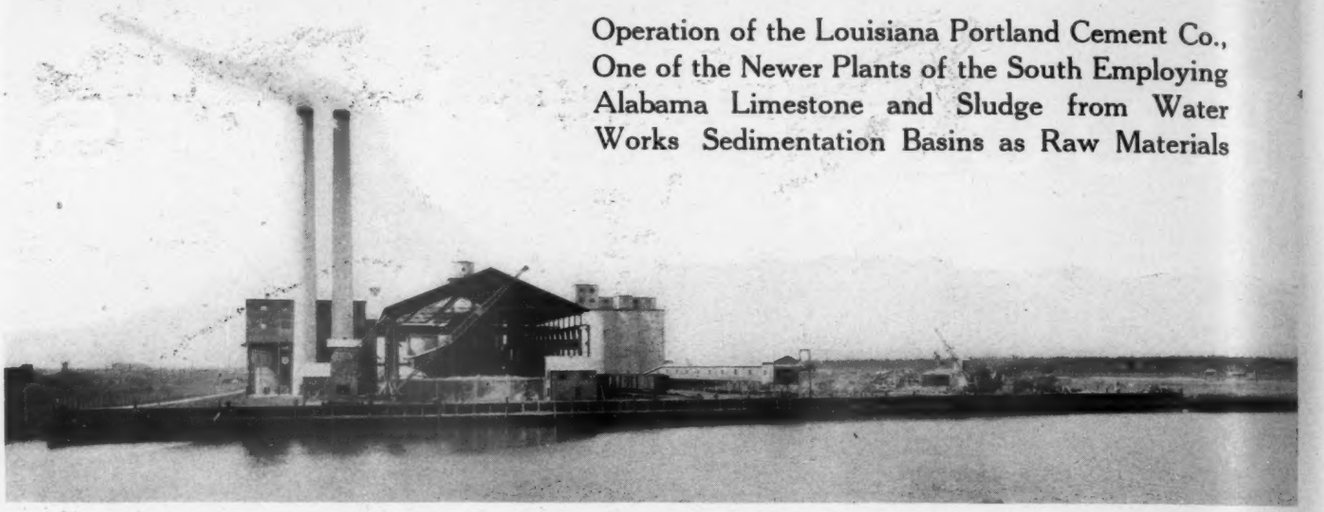
Volume XXXI Chicago, April 14, 1928 Number 8



Pug-mill in which the soft lime rock is mixed with sand and water-works sludge before going to the raw grind mill at the Louisiana Portland Cement Co. plant

The New Orleans Cement Plant

Operation of the Louisiana Portland Cement Co., One of the Newer Plants of the South Employing Alabama Limestone and Sludge from Water Works Sedimentation Basins as Raw Materials



Unloading dock and limerock storage seen from across the Navigation Canal

IT WAS INEVITABLE that a cement plant should be built at New Orleans, the great transportation center of the South, ocean port, railroad center and terminus of the Mississippi-Warrior river barge lines. For in addition to long distance shipping facilities there is a strong local market, much of it within trucking distance, in the industrial centers that are growing up on both sides of the river around New Orleans and in the northern part of Louisiana.

The Louisiana Portland Cement Co. is one of the units of the International Cement Corp., an organization which has built some of the best plants in America and foreign countries, and the New Orleans plant is worthy to stand up with the best of them. The people of New Orleans appreciate this. Ordinarily the "man in the street" of a big city cannot tell you where a cement plant is located, if he knows there is one in town. But in New Orleans everyone knows where the Louisiana cement plant is, and if you ask a business man about it he will probably go on to tell you what a good thing it is for the city.

An Example of the Value of Advertising and Good Will

Before the plant was built foreign cement found one of its principal markets in New Orleans, but today importations are greatly reduced and the money that was sent abroad is spent in the city, and it amounts to many thousands of dollars annually.

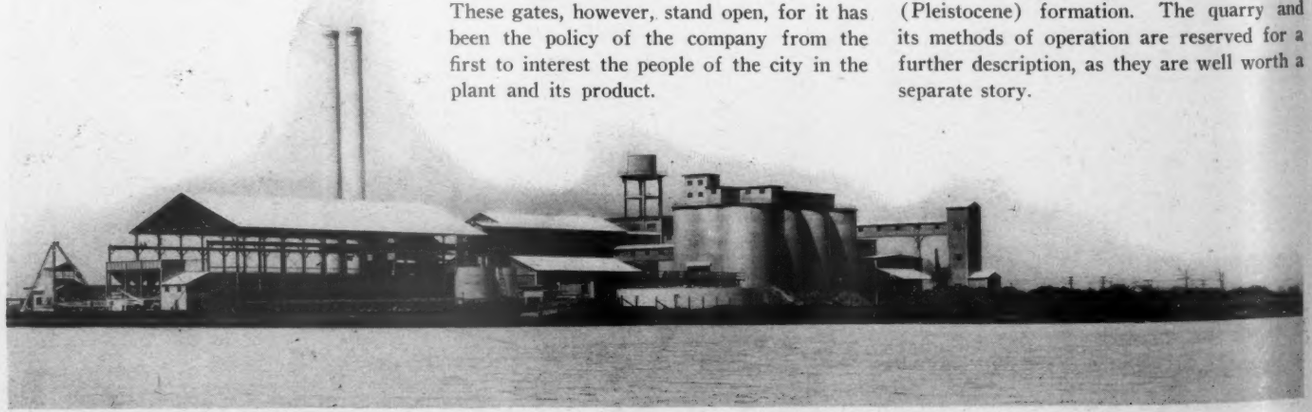
As the pictures show, the buildings make an architectural group of striking appearance and one that does not look at all out of place in a locality that is fast being built up with neat homes such as the better class of working men and salaried employes build. Some of the buildings are of the natural cement color and others are covered with a buff colored stucco. The grounds are being made into lawns with concrete drives and walks, and the plant is enclosed with Page fencing, admittance being through an ornamental gate of concrete and wrought iron. These gates, however, stand open, for it has been the policy of the company from the first to interest the people of the city in the plant and its product.

Raw Materials

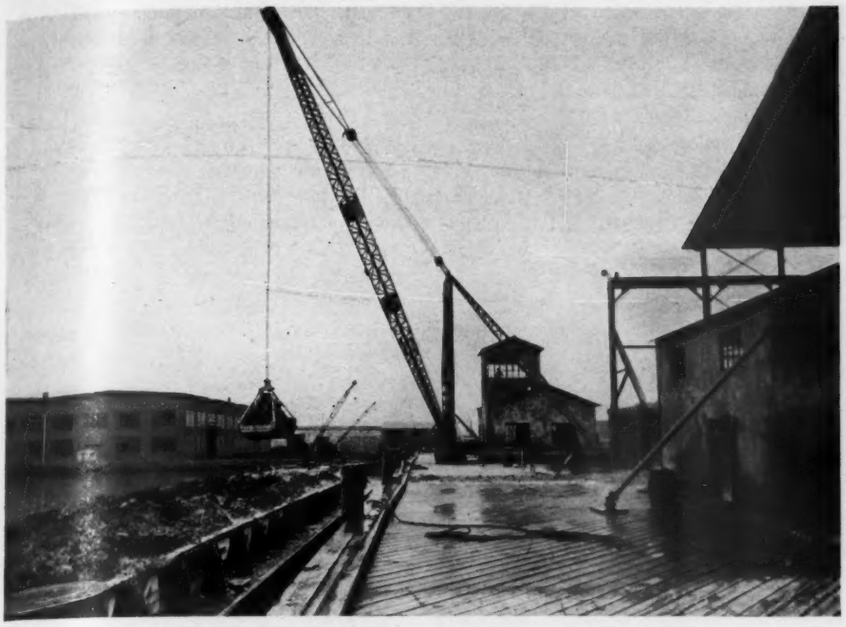
After considering various sources of lime, including the shell deposits of the lakes and gulfs, it was found that the most economical lime bearing material available was in the limestone deposits of southern Alabama.

This Alabama limestone is almost as soft as chalk, and much of it is a limey mud, fine enough for cement slurry without grinding. Even though the quarry is 270 miles from the plant, cheap water transportation, the lessened cost of grinding and the simplification of the plant operation from the unloading docks to the kilns made it the economical material to use.

The limestone quarry is at St. Stephens, 100 miles north of Mobile on the Tombigbee river. The rock is the Marriana limestone, first noted near Marriana, Fla. It is much like the well-known Tampa limestone of Florida, and geologists thought it was the same until a study of its fossils placed it in the Oligocene strata, while the Tampa limestone was known to be of a younger (Pleistocene) formation. The quarry and its methods of operation are reserved for a further description, as they are well worth a separate story.



From left to right the photograph shows unloading dock, limerock storage, clay slurry tanks, clay storage basin, silos and coal crusher building and conveyor



Part of the 600-ft. dock with derrick for unloading barges

Problems connected with the peculiar kind of quarrying that has to be done, and transportation on a river that may rise 40 or even 50 ft. quite suddenly, make it different from other cement-mill quarry operations. For the present it is enough to say that the rock is quarried by Bucyrus electric shovels without blasting, loaded into standard-gage cars, which are handled by 12-ton Vulcan gasoline locomotives, and drawn to a simple crushing plant. Here it is put through a Dixie hammer mill, a type of machine that has been conspicuously successful in crushing sticky and muddy materials like this limestone.

The feed to the mill consists of fairly hard boulders in a matrix of the limey mud mentioned and the discharge consists of a few pieces of 2-in. and under-size with a great deal of fines, much of the discharge being finer than 200-mesh. It contains from 85 to 95% of calcium carbonate ($CaCO_3$).

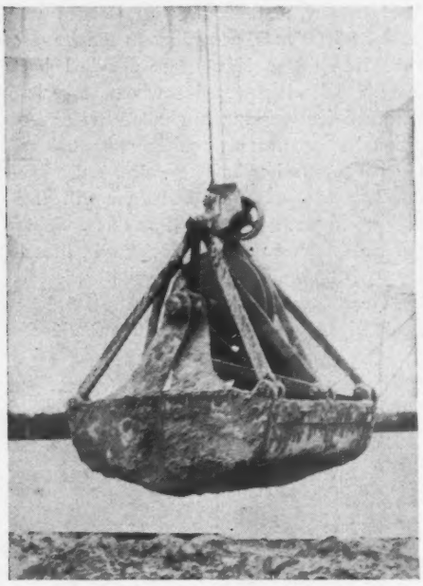
It is brought to the cement plant in barges 180 ft. long and 40 ft. wide, loaded with 1200 or 1000 tons, according to the stage of the river. The barges are handled by a 500-hp. Diesel powered towboat, especially designed for working in shallow water. Additional leased marine equipment is employed, but barges and towboats are now under construction to displace it; and these will probably be in service by the time this article is published. Transportation costs will then be lowered to compare favorably with those on the Great Lakes, where so much cement raw material is quarried in Michigan and distributed to the plants at several lake ports.

The site of the Louisiana plant is on the Navigation canal that connects New Orleans

Long conveyor that brings sacked cement to the dock for loading vessels

Interior of lime rock storage. The lime rock is a mixture of hard pieces in a matrix material called "lime clay"

with the gulf through Lake Ponchartrain. Much of New Orleans is below the level of the Mississippi river and protected by levees. But the cement plant site is above the river level on ground that was made by pumping in silt. This filling was done by the city. In this way filled-in ground for a large industrial section near the turning basin of the canal has been created. The level of the plant site is the same as that of the top of the lake levees, by which the city is protected, about +32, mean gulf level.



Type of bucket which unloads barges

Advantageous as the site was in some ways, it had its disadvantages as a support for the heavy machinery of a cement plant, for it will hold no more than 500 lb. to the square foot. All foundations had to be placed on piles and more than 7500 of them were driven. The ground was so soft that the piles sank practically by their own weight for 30 or 40 ft. until a stratum of hard sand was reached that gripped them securely.

As the ground above was so soft, piles had often to be driven in groups and connected to prevent the danger of lateral motion. Afterwards a mat of cypress planking was put down and a reinforced-concrete slab was laid so as to cap the piles. The work was well done, for regular checking of levels with instruments has shown no sinking or lateral movement of those parts of the plant which are on pile foundations.

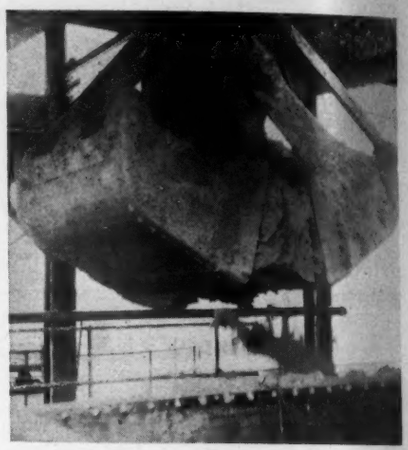
Construction Details

On account of the nature of the soil, the lighter types of construction were preferred to the massive types, but all the buildings are of some combination of cement and aggregates. The main buildings are largely of steel frame with curtain walls of "stone-tile," but some of them are of cement plaster on "Trus-con" metal lath. Roofs are largely of cement-asbestos corrugated sheets made by the Dorn company, in New Orleans, or by the Johns-Manville Co. In fact the plant is an excellent example of how portland cement may be adapted to any condition of construction. The design and some of the methods of construction were worked out by the engineering staff of the International Cement Corp., but the construction was all done by the Burrell Engineering and Construction Co. of Chicago. The electrical work was by the General Electric Co. and General Electric machines and accessories are used throughout the plant.

Handling Lime Raw Material

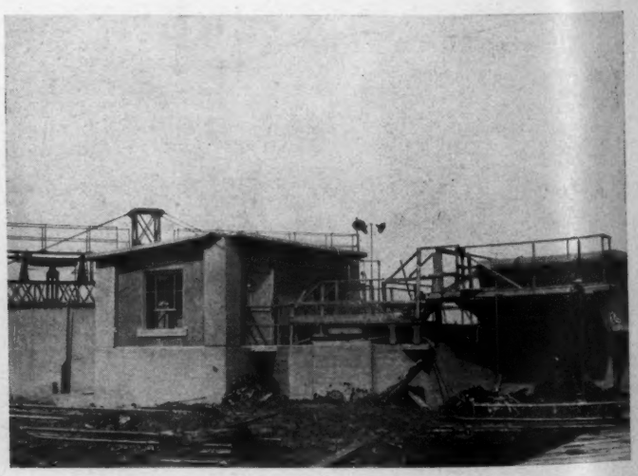
The barges of limestone from the quarry are unloaded at a dock 600 ft. long and 22 ft. wide, built by local engineers, which runs across the entire water front of the plant. It is used for loading ships and barges with cement as well as for unloading raw material. The barges are unloaded by an American Hoist and Derrick Co.'s stiff-leg derrick, with a 90-ft. boom, handling a 3-yd. Hayward bucket, Class E, a type designed to unload barges without injury to the deck and with the minimum amount of hand shoveling. The main hoist has three drums driven by a 125-hp. motor, and there is a separate swinging hoist with a 30-hp. motor. All controls are carried to a tower on the roof of the hoist house, where the operator sits. There are 12 controls, 10 for brakes and two for starting compensators, each operated by a lever and pipe connecting rod, nicely balanced after a system worked out by the International engineers. The unloading system is considered very satisfactory, and it has been designed with ample latitude for increased production in the future.

The derrick bucket places the limestone (which looks and handles like a stiff clay) in the raw storage, 220 ft. long and 100 ft. wide. This is spanned by a "Milwaukee" traveling crane that handles another 3 yd. Hayward bucket. As with the rest of the plant, the construction of the storage had to conform to the character of the soil, so the whole bottom is a reinforced-concrete slab on piles set about 6 ft. centers. The walls are 18 ft. high and they have broad "heels" and broader "toes" to give them bearing surface, besides being set on piles. The "toes" of the long side walls are connected by two great concrete beams, each reinforced by seventeen 1½-in. steel rods, to prevent spreading. Altogether 883 piles had

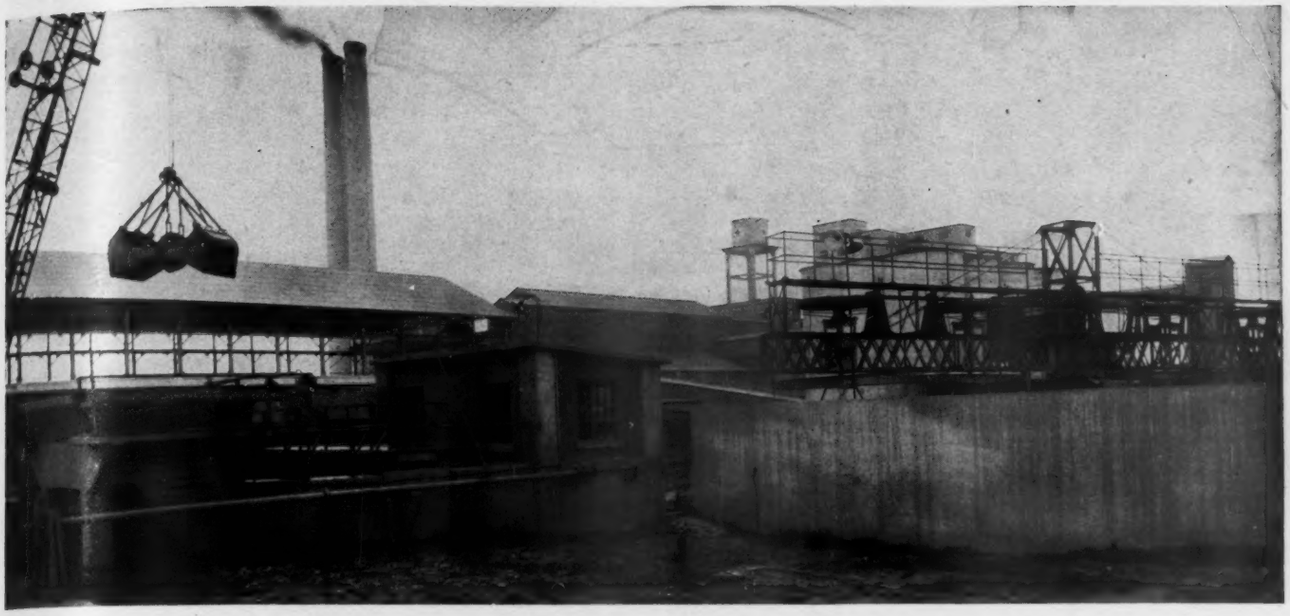


Bucket feeding limerock into pug mill

Unloading clay (water works sludge) from cars



House for clay pumps and wash mill (at right)

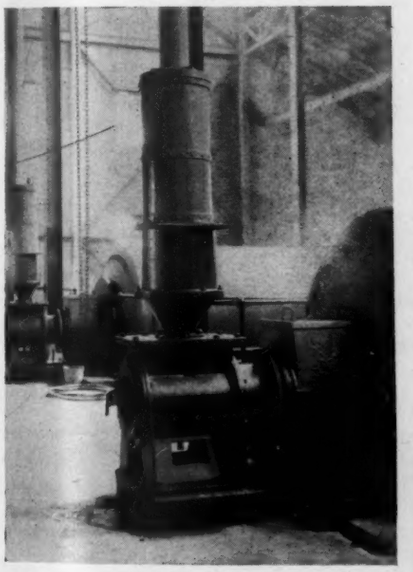


Crane filling wash mill, pump house for clay transfers and clay storage basin

to be driven to support the storage shed and its walls.

Handling the Clay Raw Materials

The clay (the water-works sludge) does not go into the raw storage. It is brought



Feed end of tube mill with checking pot used as meter

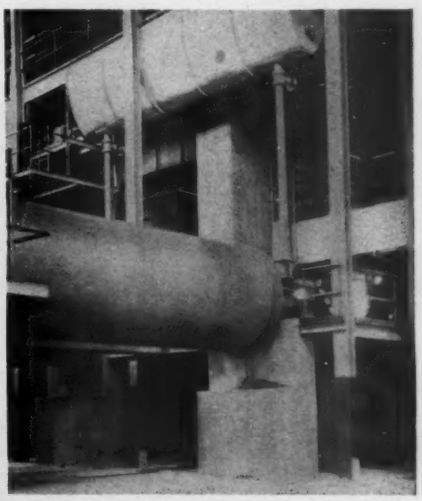
in by the railroad in open-top cars which are unloaded by a Brownhoist locomotive crane and 1-yd. bucket, the only steam-driven machine about the plant. This crane places the clay in the hopper of a 20-ft. wash mill, designed by the company's engineers, but following the usual lines for such a machine, and driven by a 25-hp. motor. From the wash-mill the clay is pumped by two Morris Machine Works 3½-in. centrifugal pumps, direct-connected to 25-hp. motors, to the clay storage basin, set behind the wash-mill. It is 70 ft. in diameter and usually contains 8 ft. of clay slurry.

The agitating gear of this storage basin is driven in an almost unique manner. There are four revolving agitators, 12 ft. long, which are suspended from a truss that is pivoted on a central pier and supported on a heavy ball bearing. Electric current is brought in by brushes and rings on the central pier and it drives a 10-hp. motor connected to a shaft through a James spur-gear

Discharge end of raw tube with sampler

speed reducer, 42 to 1 ratio. The arrangement is shown in one of the pictures. The unusual feature is the way the truss is revolved on the central pier, as this is wholly by the reaction of the agitators on the mass of clay slurry to the side wall of the tank. This agitator is hardly known in the United States, but is used in several English plants.

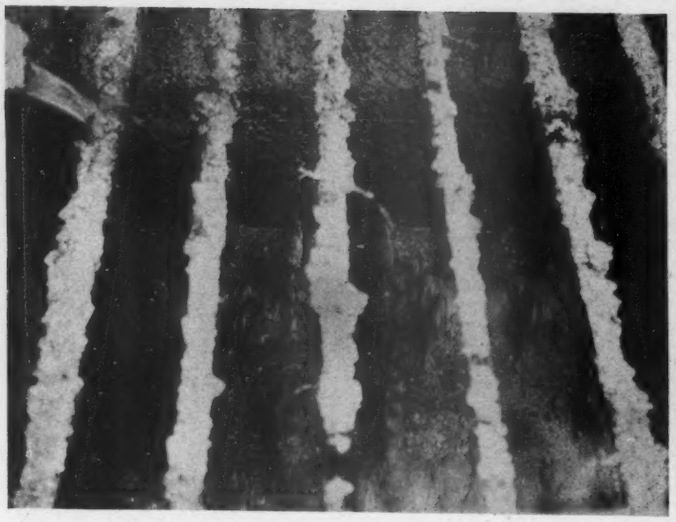
From the clay storage basin the clay is pumped by another pair of Morris 3½-in.



Tube mill and feed trough with agitator

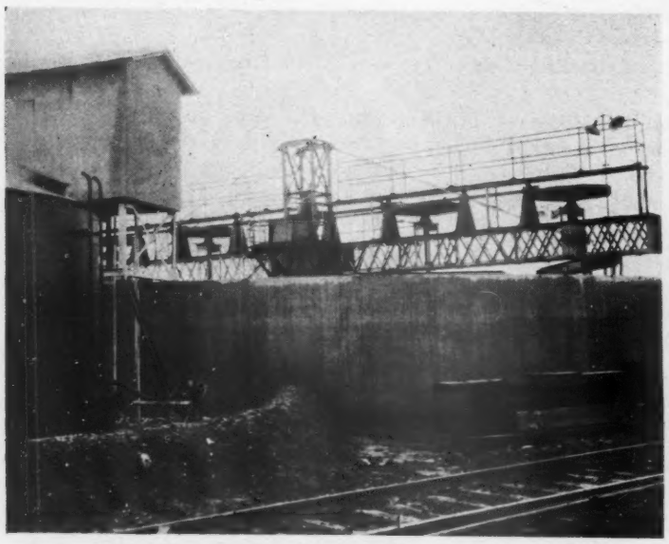
pumps, with 25-hp. motors, to the clay correcting basins, which are set near the limestone storage. They are 22 ft. in diameter and 27 ft. high and are provided with the standard agitating device used in International plants, except that there are no air lifts, as in the cement slurry tanks. The clay contains 65% of moisture and can be sufficiently agitated by stirring arms only. The purpose of these tanks is to allow for correction of the clay alone before adding it to the limestone, but not much correction is needed, as the mixing in the large storage basin is usually enough to secure uniformity.

Equipment similar to that used in pre-



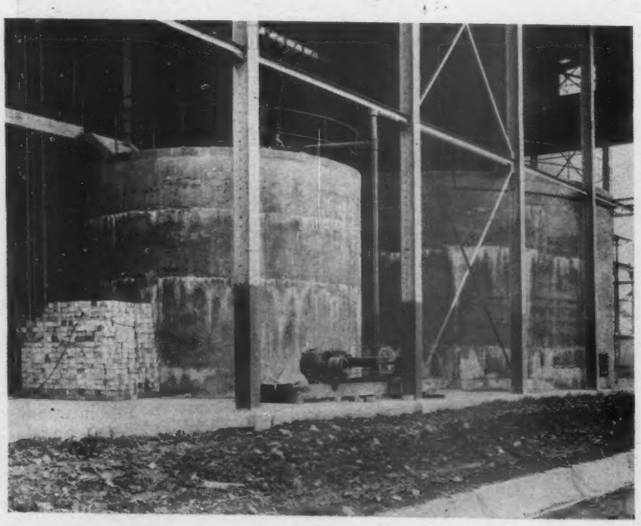
Looking into pug-mill. The white lines are bars above it to receive the bucket load

End of pug-mill and the hopper used for feeding sand to the raw mix

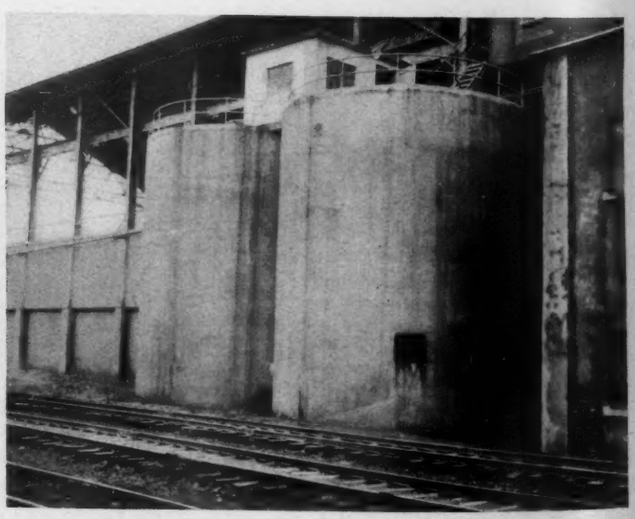


Exterior of clay storage basin showing the truss and supporting center pier

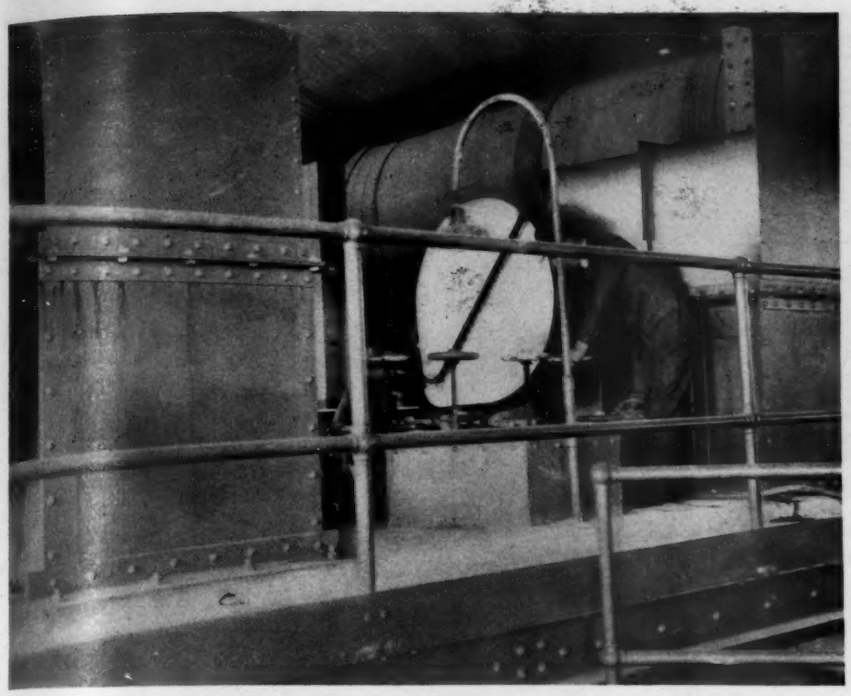
Agitators in clay storage basin. The truss is turned by their reaction



Collection basins for slurry in kiln room



Correction basins for clay slip near pug-mill



Distributing box for slurry between the two slurry elevators

vious transfers pumps the clay from these correction basins to a slurry feeder of the same type that is used to feed slurry to the kilns. This feeds the clay to join the limestone in a machine that is rather new in the American cement industry, a pug-mill. Although similar to the pug-mills employed in the ceramic industry, it is larger and somewhat heavier built than they usually are. The main trough is 15 ft. long and 6 ft. 10 in. wide and it contains two shafts with paddles 37 in. from end to end. The shafts revolve in opposite directions and the blades on one shaft pass between those on the other shaft and thoroughly cut and churn the mixture of limestone and clay.

Fine beach sand, practically pure silica, is added here, to the extent of 3% or less of the weight of the dry material. It is fed from a hopper at one side of the limestone hopper of the pug-mill. The sand hopper has a rotating feeder driven through gears from the pug-mill drive, and by changing gears any proportion of sand may be fed. A chart hanging by the spare gears shows what gear to use for the desired percentage to be added.

The drive of the pug-mill is a 75-hp. motor connected through a Link-Belt silent chain and gearing. The clay feeder which feeds the pug-mill is driven by a 3-hp. direct-current motor through a James spur-gear reducer.

Raw Grinding Department

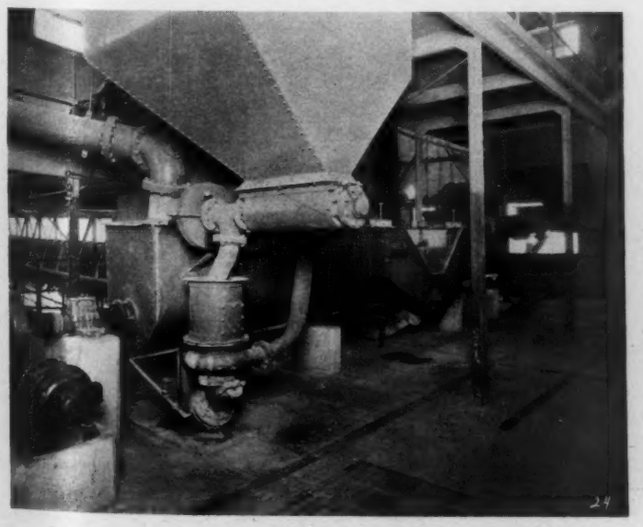
All the raw materials, and the right amount of water to make cement slurry, are combined in the pug-mill so that the discharge is ready for the grinding department. It goes there by an 18-in. screw conveyor 72 ft. long, driven by a 25-hp. motor through a Cleveland worm-gear speed reducer. Two sliding gates in the side of the conveyor trough allow the mixture to be fed to either of two F. L. Smidth kominuters, each driven by a 125-hp. supersynchronous motor through a special gearing of Smidth make.

The grinding in the kominuters is almost enough to make satisfactory slurry, as 74% of the discharge will pass a 200-mesh screen. This leaves so little for the tube mills to do that an output of 250 bbl. per hour is obtained from one kominuter and one tube mill, leaving the other set for a spare, and providing for future increased production. The tube mills are 7x30 ft. and each is driven by a 600-hp. supersynchronous motor.

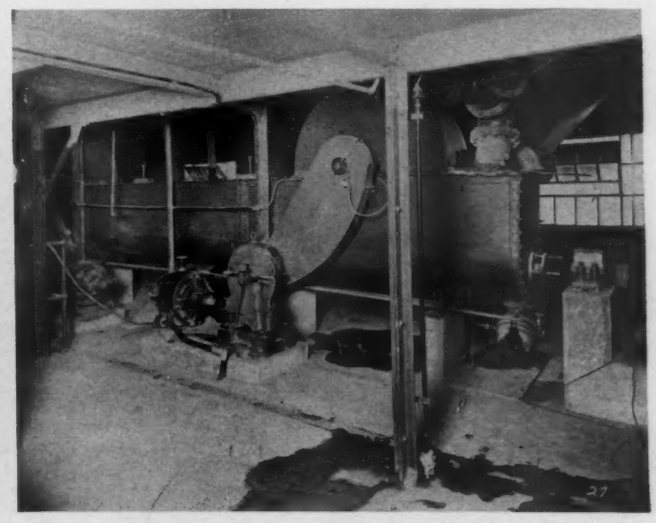
The method of feeding the tube mills is somewhat elaborate. The kominuter discharge flows to an 18-in. elevator, 45-ft. centers, that lifts it to a trough, in the bottom of which is a horizontal agitator. A scoop arrangement insures the spreading of the feed along the trough. From the bottom two pipes go down to the tube mill, each discharging into a "checking pot" at the feed ends of the mills. The checking pots are of known content, and can be used to determine the quantity going to the mill, thus serving as a meter; and they are used for that regularly by the chemist. When two mills are being operated this arrangement insures that each will receive the right amount and the same quality of feed.

Slugs 1 in. long and 5/8 in. in diameter are used as the grinding media, the charge being 95,000 lb. The tubes are lined with Smidth "drag-peb" lining and are driven at 23 r.p.m. The discharge is finer than 90% through a 200-mesh screen.

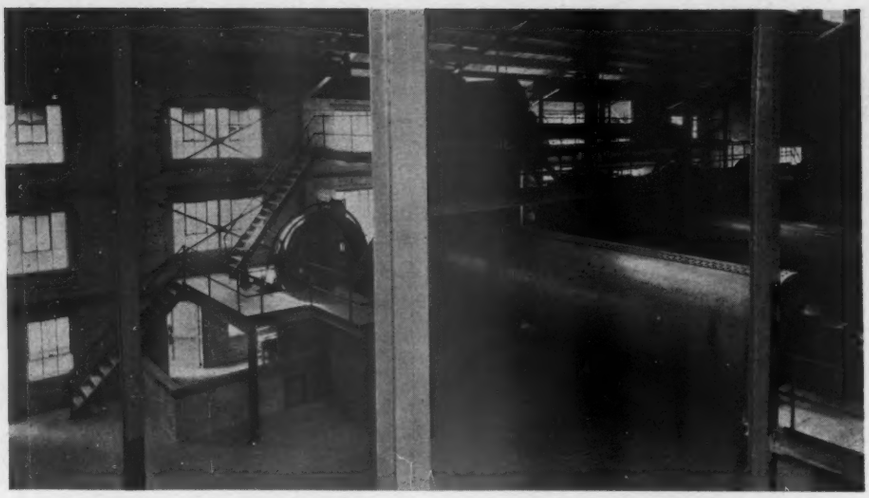
The discharge goes by a 16-in. elevator that lifts it 28 ft. to a 16-in. screw con-



Slurry feeder with dust hopper and mixing pot in foreground



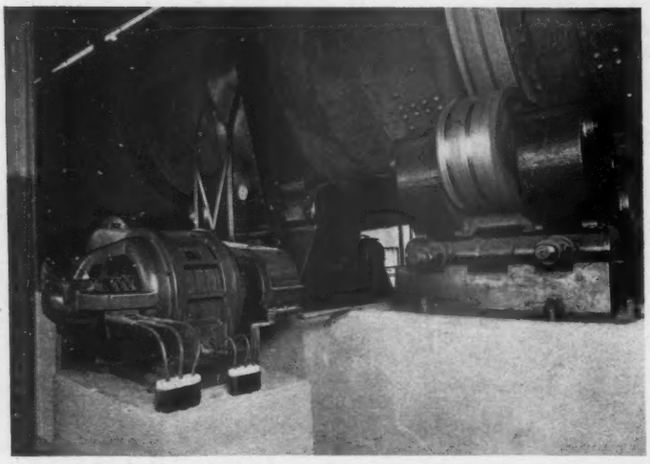
Direct-current motor and chain and gear driving slurry feeder



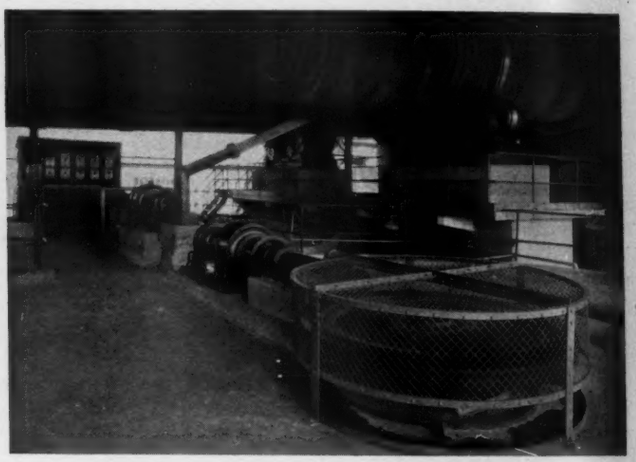
Tube mills in the mill house. The two nearest are for raw grinding and the two elevators at the back raise the slurry to the conveyor that takes it to slurry tanks

veyor, 40 ft. long, which passes it to a second screw, 62 ft. long, set at right angles. To avoid repetition it may be stated here that all screws and elevators throughout the plant have drives which are practically standard. The screws are driven by a motor (usually 10-hp.) working through a James spur-gear speed reducer, and the elevators are driven by motors, which are also usually 10 hp., through a Link-Belt silent chain and gears and pinions; the standard speed for elevator drives is 20 r.p.m.

The raw-grind machinery just described is housed with the finish-grind machinery in what is called the mill building, 110 by 119 ft. It is built of structural steel with curtain walls of stonetile, and the stonetile are carried around the columns to form pilasters which add much to the outside appearance of the building. Reinforcing rods are concreted in the hollow spaces of the stonetile



Slip ring motor driving kiln and enclosed cut gearing



Floor under kiln with agitator gears for mixing basins

One of the preliminary raw-grind mills with motor and special gear by which it is driven

near the columns. The machinery foundations are placed on closely spaced piling, and the walls are on piling, groups of piles being placed under each column and at the corners. All sills are of reinforced concrete, but the lintels are of steel. The roof is of Johns-Manville corrugated cement-asbestos sheets.

The housekeeping in this mill is extraordinary even in these days of well-kept plants. The air is absolutely dustless, for reasons that will be given later, and not a spot of slurry shows on the raw-grind side. The enclosed handling and feeding systems aid in keeping everything in this immaculate condition.

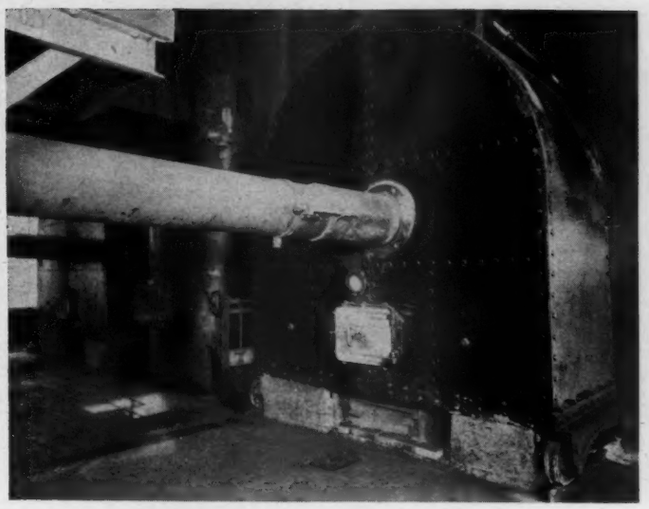
Slurry Blending and Correction

From the 62-ft. screw conveyor which has been mentioned the slurry may be turned into any one of three correcting basins, all 20 ft. in diameter and 20 ft. high. They are fitted with the standard agitator gear used in most of the International plants, consisting of a central shaft with arms which sweep the bottom, and four air lifts set on the four quarter points of the circumference.

The central shaft with arms is driven by a 20-hp. motor through a James spur-gear speed reducer and a flexible coupling. The 900 r.p.m. of the motor is brought down to 23 r.p.m. by the speed reducer and to 2 r.p.m. by a gear and pinion.

The air lift is made of a 4-in vertical pipe and a 1-in. air pipe beside it, the bottom of the air pipe being turned into a half circle so as to blow air into the bottom of the 4-in. pipe.

Experiments were being made with a 6-in. General Pump Co.'s centrifugal pump as an auxiliary agitator when the notes for this article were being taken. It can also be used as transfer pump.



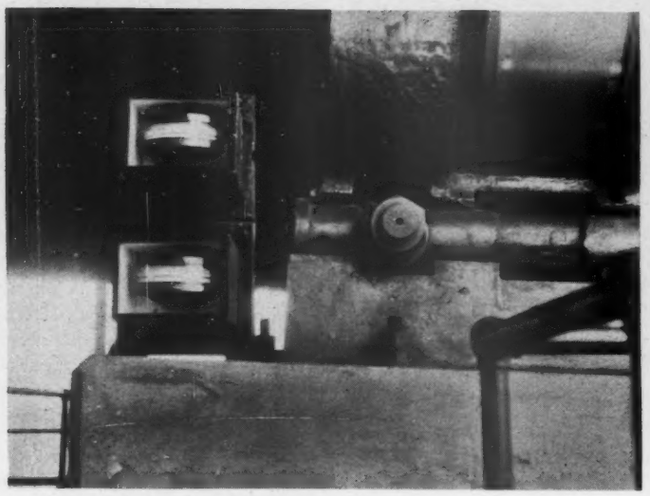
Kiln hood and pipe for powdered coal

Two 16-in. elevators, called mixing elevators, take the slurry from the correcting basins and send it to the mixing basins, which are below the kilns as they are in most International plants. These elevators are fed by gravity through a system of pipes and valves which allows the flow to come from any tank, or from more than one tank. They discharge into an octagonal box with several partitions and valves arranged so that the discharge may be sent to any tank; giving the widest possible latitude in mixing slurry for correction or for transferring it from one tank to another.

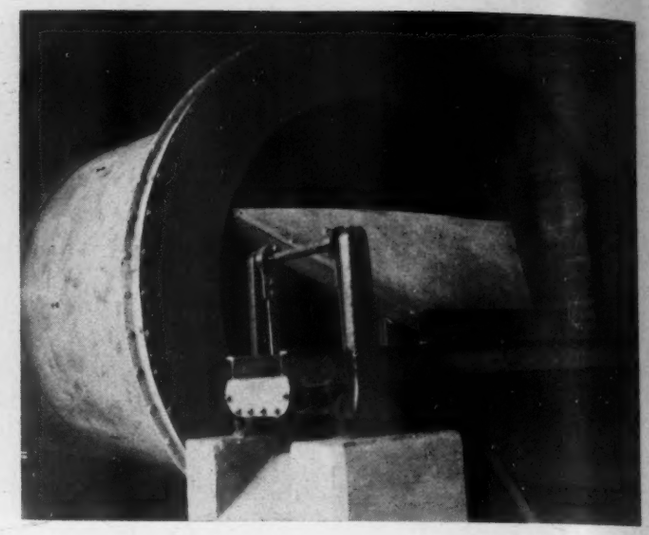
The mixing basins are 38 ft. in diameter and 28 ft. high, and they are fitted with agitators and air lifts like those used in the correcting basins.

From the mixing basins the slurry goes by gravity to two elevators, 80-ft. centers, which lift it to the tank of the double slurry feeder that feeds both kilns. This is of the "Ferris wheel" type, and it is fitted with more refinements than such feeders usually are. The slurry flows into it from the elevators through two 12-in. pipes that discharge into a trough 25 ft. long. A screw in the bottom acts as an agitator and sets up a current that keeps the overflow constant, the height of the overflow, and hence the level of the slurry, being controlled by two sliding gates moved by fine-threaded screws. From this trough the two bucket wheels take their loads, each being driven by its own 3-hp. variable speed motor, using direct current, with velocities from 500 to 900 r.p.m. Speed is reduced by a James spur-gear speed reducer and Link-Belt silent chains, and the revolutions of each wheel are counted by its own electric counter.

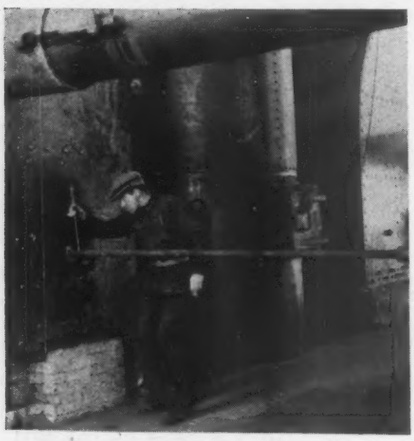
Looking down the kilns from the kiln feeder floor



Pyrometers for kiln gases



End of cooler with clinker lifts



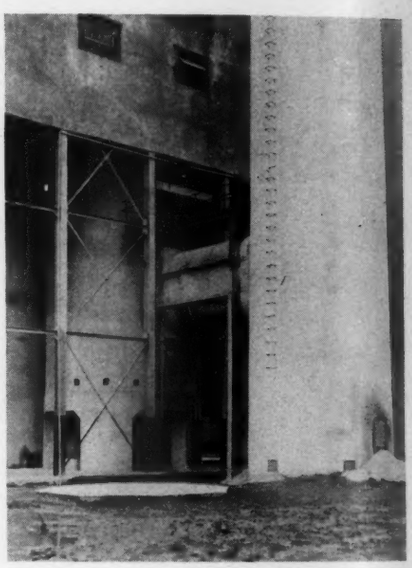
Testing heat at kiln hood

The feeder discharge flows to a mixing pot where the dust from the stack and chamber is added. The slurry enters at one side to form a vortex in the center of which the dust is discharged from an elevator.

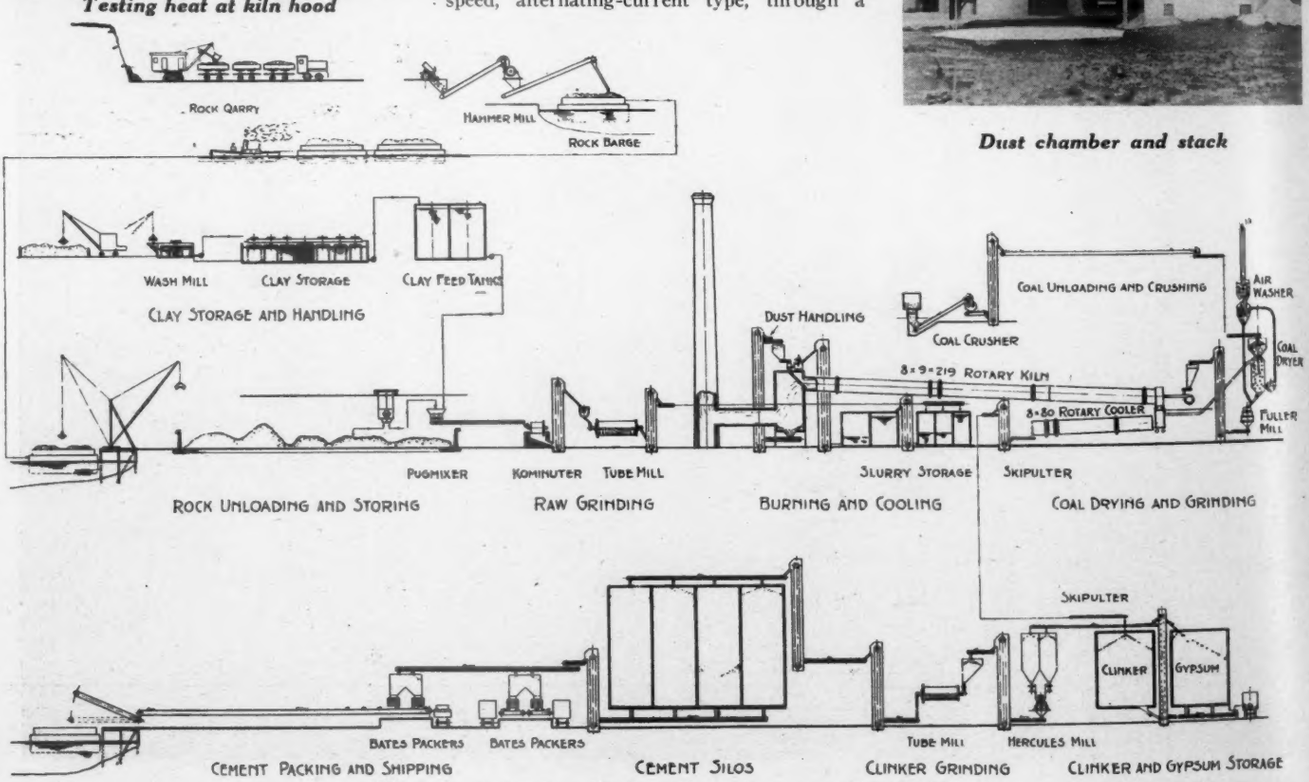
The feeders are in a large, cool and well-lighted room above the kilns, and it also contains the draft gages and the windlasses by which the stack draft is regulated.

Kilns and Burning Practice

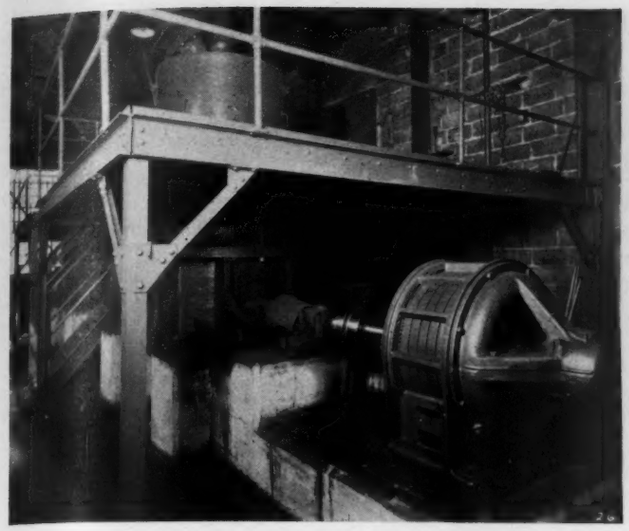
The two kilns are 220 ft. long, 9 ft. in diameter for the first 75 ft. (the hot end) and 8 ft. in diameter for the remainder. They are of Reeves Bros. make. Each is driven by a 60-hp. motor, of the variable speed, alternating-current type, through a



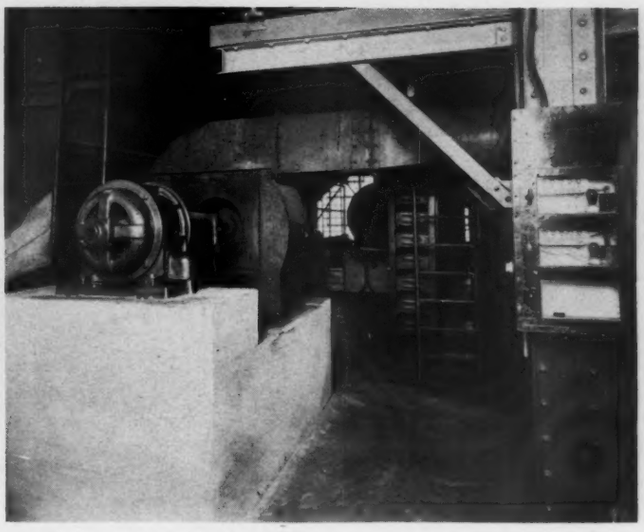
Dust chamber and stack



Flow sheet showing all the units and course of material



Coal mill and motor



Fan for powdered coal

Link-Belt silent chain to a gear and pinion, then through a spiral gear, at right angles, to another gear and pinion. This makes a compact arrangement and all of it, including the motor, is neatly housed. The kiln linings are "Cruzite," made by A. P. Green Fire Brick Co., laid over bricks which provide insulation.

Trouble with rings was experienced when the plant was first started, but adjustments in operation have made it possible to reduce the tendency to "ring" by slightly changing the mix. Another marked improvement was shown after an 80-lb. rail was suspended by chains in the part of the kiln where rings previously formed.

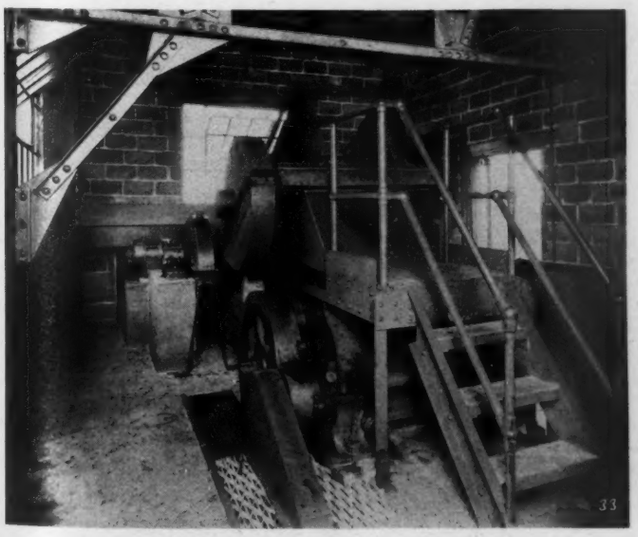
Coal Crusher

Coal from the Birmingham, Ala., district is used for kiln fuel. It is brought in by railroad cars which are dumped into a 12x14-ft. track hopper—an interesting piece of concrete construction, because it goes below the ground-water level. The greatest care was taken to make this compartment waterproof; the concrete mix being worked out to 1:2:3, and the water ratio kept at 1.1 of Abrams normal consistency. No sign of leakage has been noted. In the bottom of the hopper is an automatic drainage pump, but it has never had anything to pump but rain water which came from the ground surface.

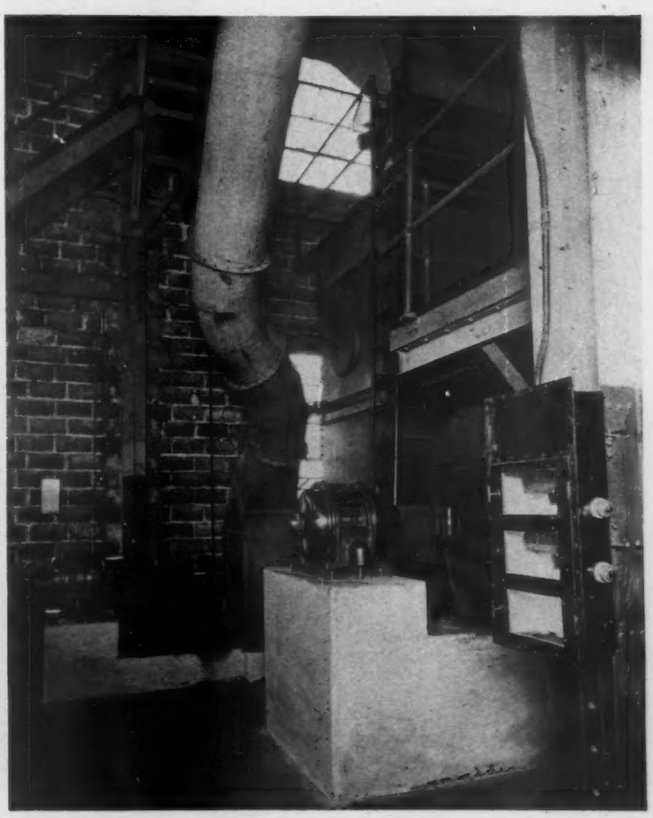
A 30-in. pan conveyor, 45 ft. long, of the Chain-Belt Co.'s make, lifts the coal from the hopper to crushing rolls on the ground floor. It is set at 27 deg. inclination and driven by a 10-hp. motor through a combination of a Link-Belt silent chain and plain chain and sprockets. The coal rolls are of Jeffrey make, 30 in. in diameter, fitted with toothed shells and driven by a 25-hp. motor through a belt.

The roll crusher discharge goes through a small hopper to a short conveyor that runs over a Dings magnetic pulley to remove tramp iron, and the pile that has been collected attests the necessity for such a separation. From this pulley the coal (about 1-in. and finer) falls into the boot of an 18-in. elevator, 67-ft. centers, that lifts it to a long 24-in. conveyor to the coal mill. The capacity of this coal-crushing plant is about 50 tons per hour.

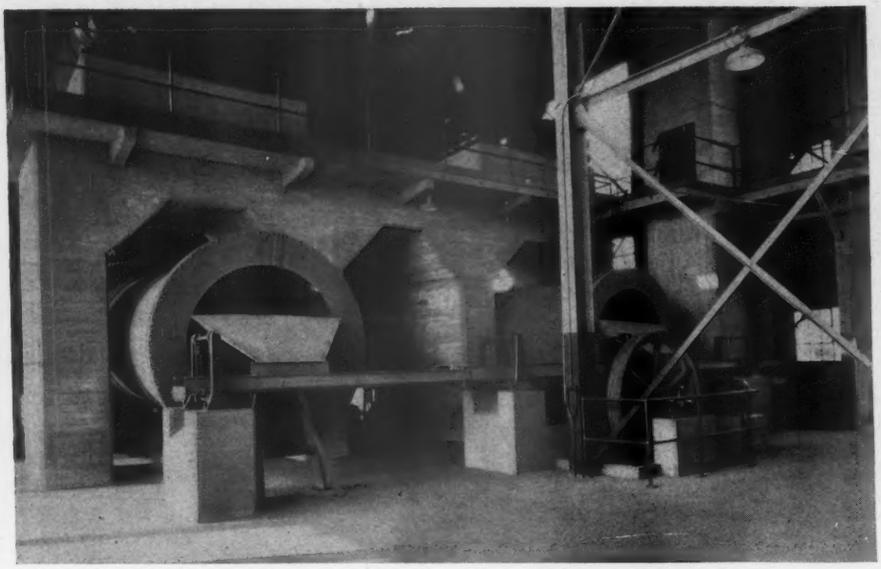
The coal crusher building occupies only a small amount of ground space, but it stands high to contain the 67-ft. elevator mentioned. The lower part of the building is of stone-tile, but to save weight the tower is made of metal lath and stucco on a steel frame.



End of conveyor above coal crusher



Drives for coal fan and coal dryer fan



End of coolers and clinker conveyor

The outside treatment shows no difference, however.

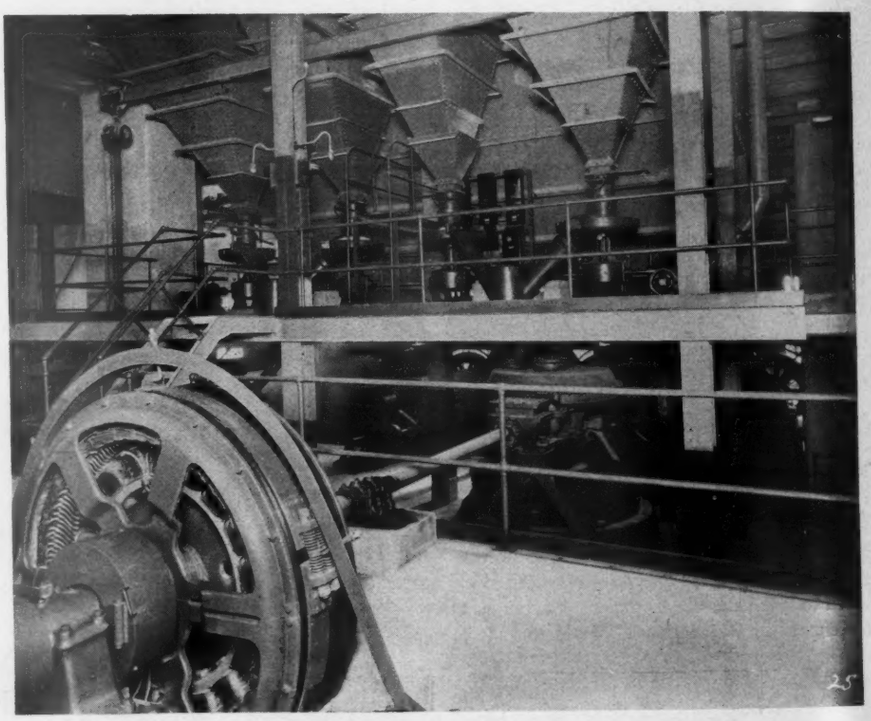
Coal Mill

The conveyor (360-ft.) to the coal mill is housed in a trussed gallery which is supported by two steel towers of graceful design, set on foundations of concrete over piling. The drive of the conveyor is a 15-hp. motor and silent chain, and the idlers are of pressed steel with Timken roller bearings.

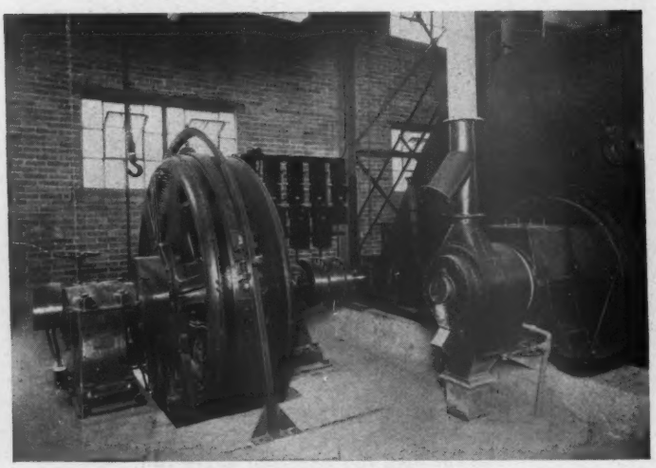
This conveyor discharges into two 20-ton hoppers in the upper part of the coal mill, a tall building set at the end of the kiln building. Waste-heat from the clinker coolers is used to dry the coal in two Randolph vertical coal dryers, which are fed by gravity from the bins mentioned. The hot air from the coolers is drawn through the dryers by two Buffalo Forge Co.'s fans, driven by 25-hp. motors, and the exhaust of this fan goes through two cyclones and air-washing chambers above to remove any coal dust that may come from the dryers. That collected in the cyclones eventually goes back to the coal mill feed. The dryers are fitted to three Bristol recording thermometers, one for recording the temperature of the incoming air from the coolers and two for the temperature of the outgoing air from each dryer. The incoming air temperature is about 250 deg., and it leaves the dryers at about 100 deg., and this is about as high a temperature as can be carried safely.

An auxiliary coal-fired furnace supplies heat to the coal dryers when a kiln is down; and experiments were in progress while this was being written to see if it might not be more economical to use this furnace altogether and put more of the heated air from the coolers back through the kilns. It was thought that the increase in kiln efficiency might more than pay the cost of coal drying with the furnace.

From the dryers the coal goes to two Fuller-Lehigh mills, direct-driven by 100-hp. motors, fed by roller feeders driven by independent motors. The mill discharge falls into a 25-ft. screw conveyor, from which it goes to a 65-ft. elevator that lifts it to the



Preliminary clinker grinders with feeders for clinker and gypsum



End of finish-grind tube mill

Preliminary finish grinders

Packing machines for finished cement

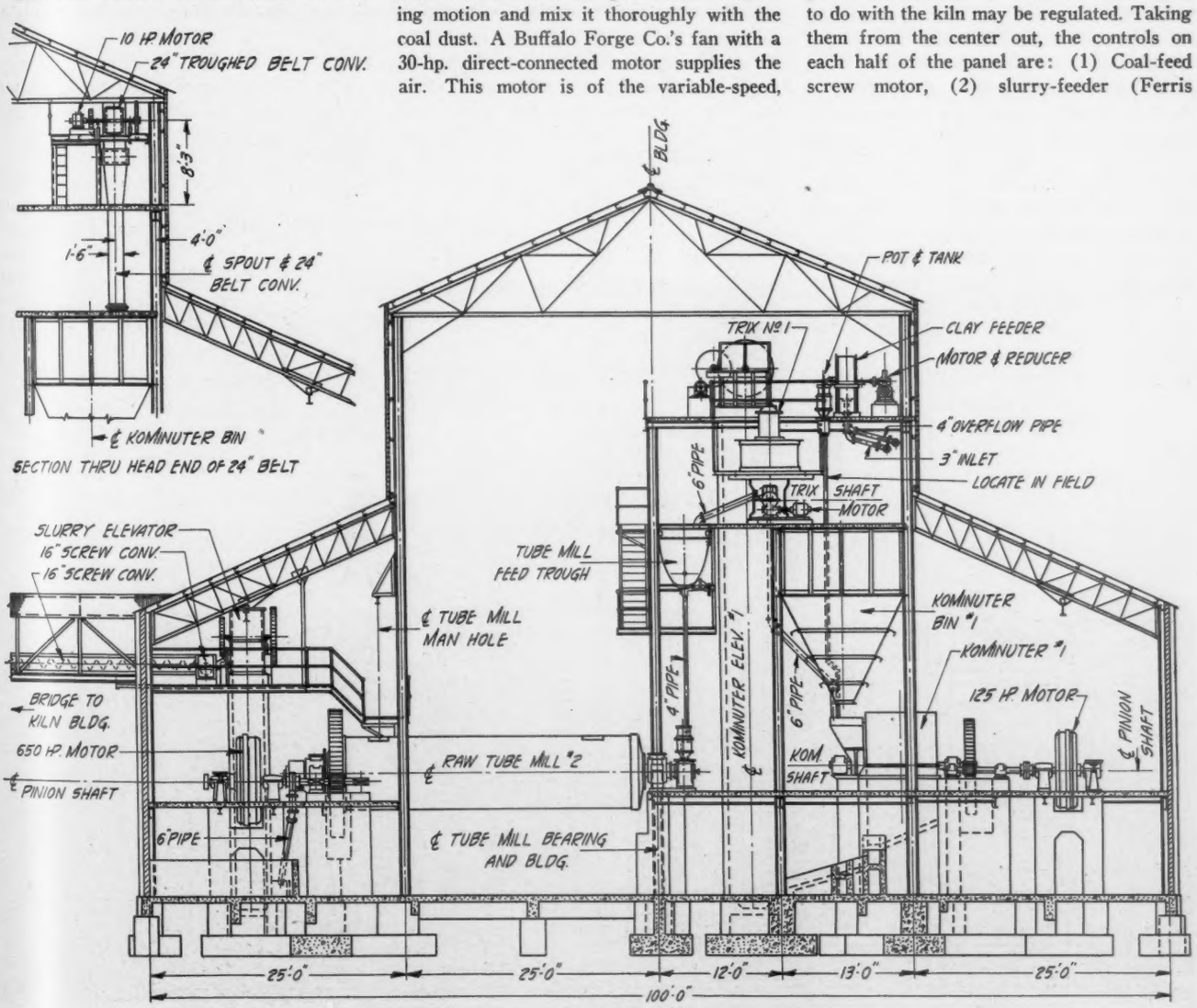
Conveyor belt and drives under packers

coal feed hoppers in front of the kilns.

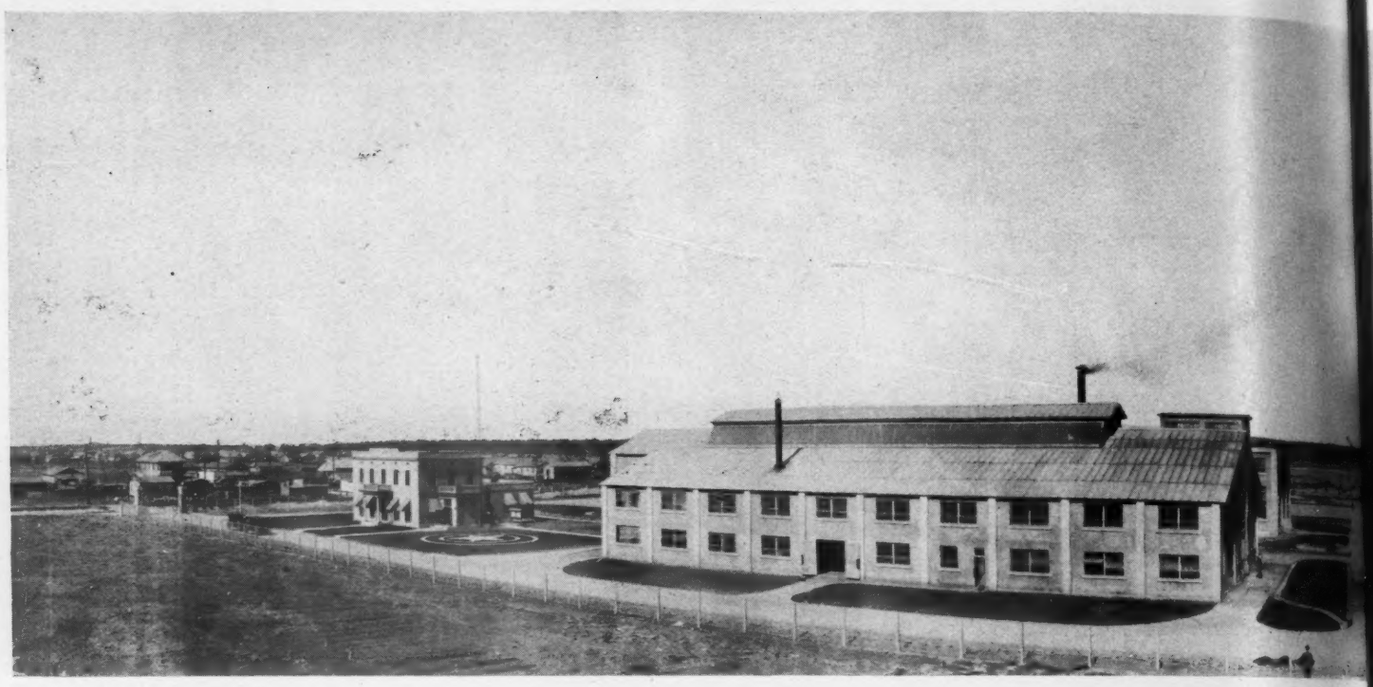
All switches, fuse boxes and starting compensators are placed on the kiln house wall, outside of the mill, to avoid the danger of coal dust getting into them.

The coal feeders of the kilns are the Fuller-Lehigh double-screw type, somewhat modified by the Louisiana company's engineers. The coal passes to the kiln through a 15-in. pipe in which there is a mixing cone, 15 in. at one end and 12 in. at the other, fitted with rifled channels that give the air a whirling motion and mix it thoroughly with the coal dust. A Buffalo Forge Co.'s fan with a 30-hp. direct-connected motor supplies the air. This motor is of the variable-speed, alternating-current type, but the motor that drives the feeder screws is a direct-current motor with a wide range of speed variation.

In front of the fan is the kiln control panel from which all machines which have to do with the kiln may be regulated. Taking them from the center out, the controls on each half of the panel are: (1) Coal-feed screw motor, (2) slurry-feeder (Ferris



Section through grinding plant on the raw mill side



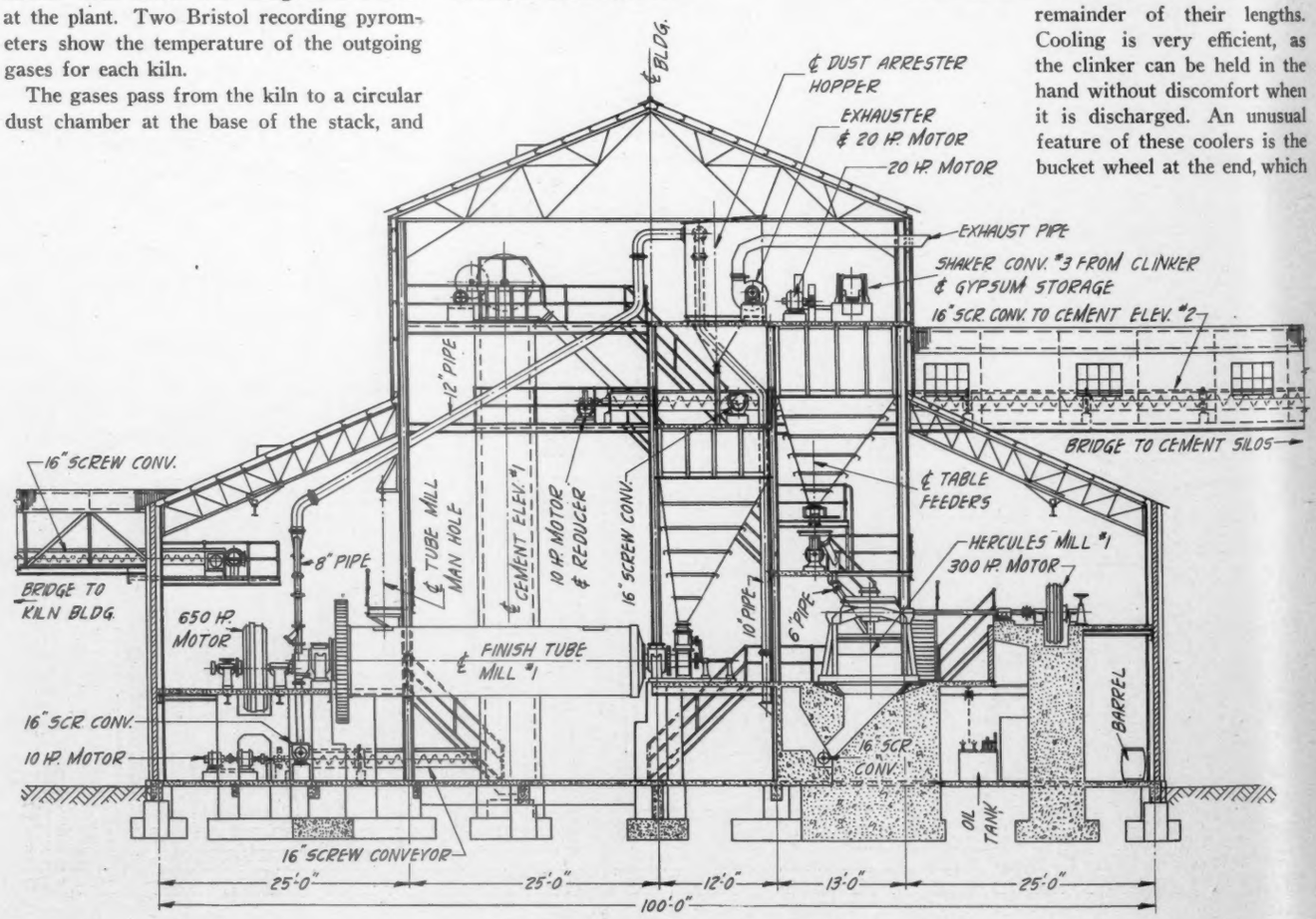
Panoramic view of the plant of the Louisiana plant showing, from left to right,

wheel) motor, (3) coal-fan motor, (4) kiln-drive motor. Each kiln is connected to a Bristol counter, actuated by a solenoid, which also causes a red lamp to light at each revolution. This device was designed and built at the plant. Two Bristol recording pyrometers show the temperature of the outgoing gases for each kiln.

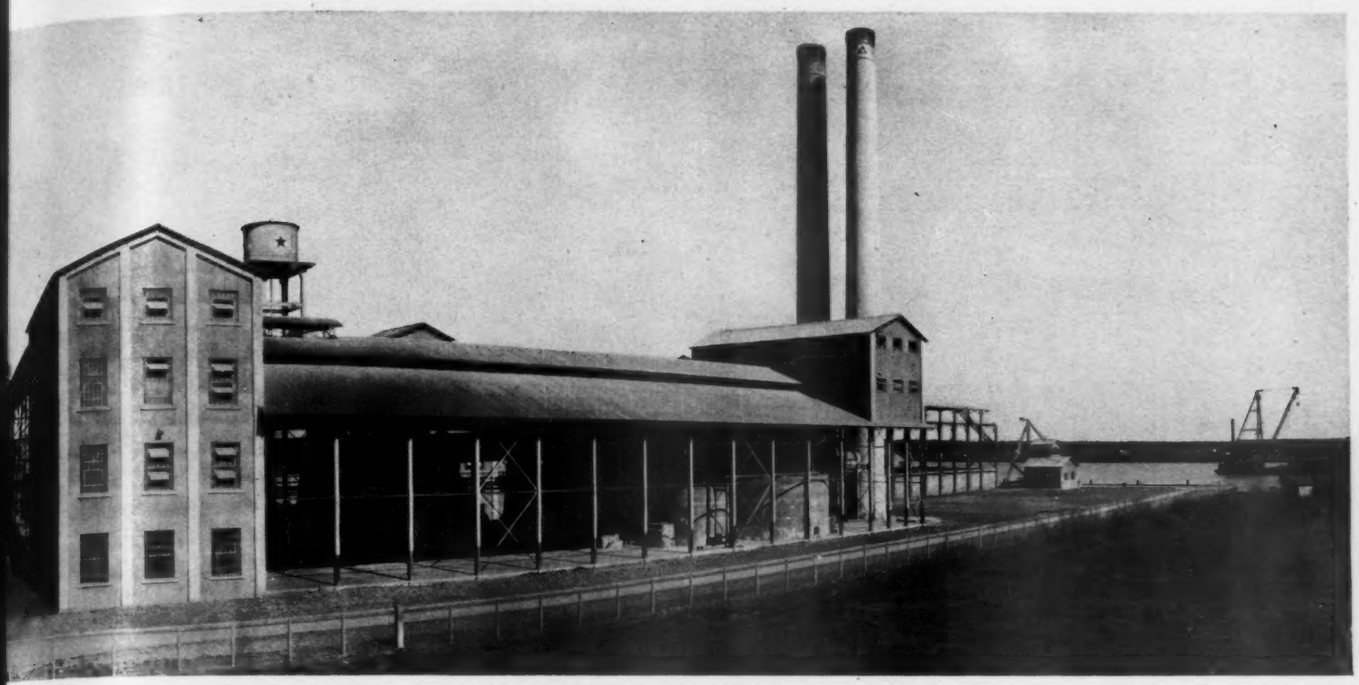
The gases pass from the kiln to a circular dust chamber at the base of the stack, and the dust from these (and that collected in the base of the stack) is taken by a screw conveyor and elevator to the mixing pot which receives the slurry from the kiln feeder, as described above.

Clinker Handling

The coolers, placed below the kilns, are 80 ft. long and 8 ft. in diameter, lined with fire brick for the first 25 ft. and fitted with lifters made of 8-in. channel irons for the remainder of their lengths. Cooling is very efficient, as the clinker can be held in the hand without discomfort when it is discharged. An unusual feature of these coolers is the bucket wheel at the end, which



Section through grinding plant on the finish grind side



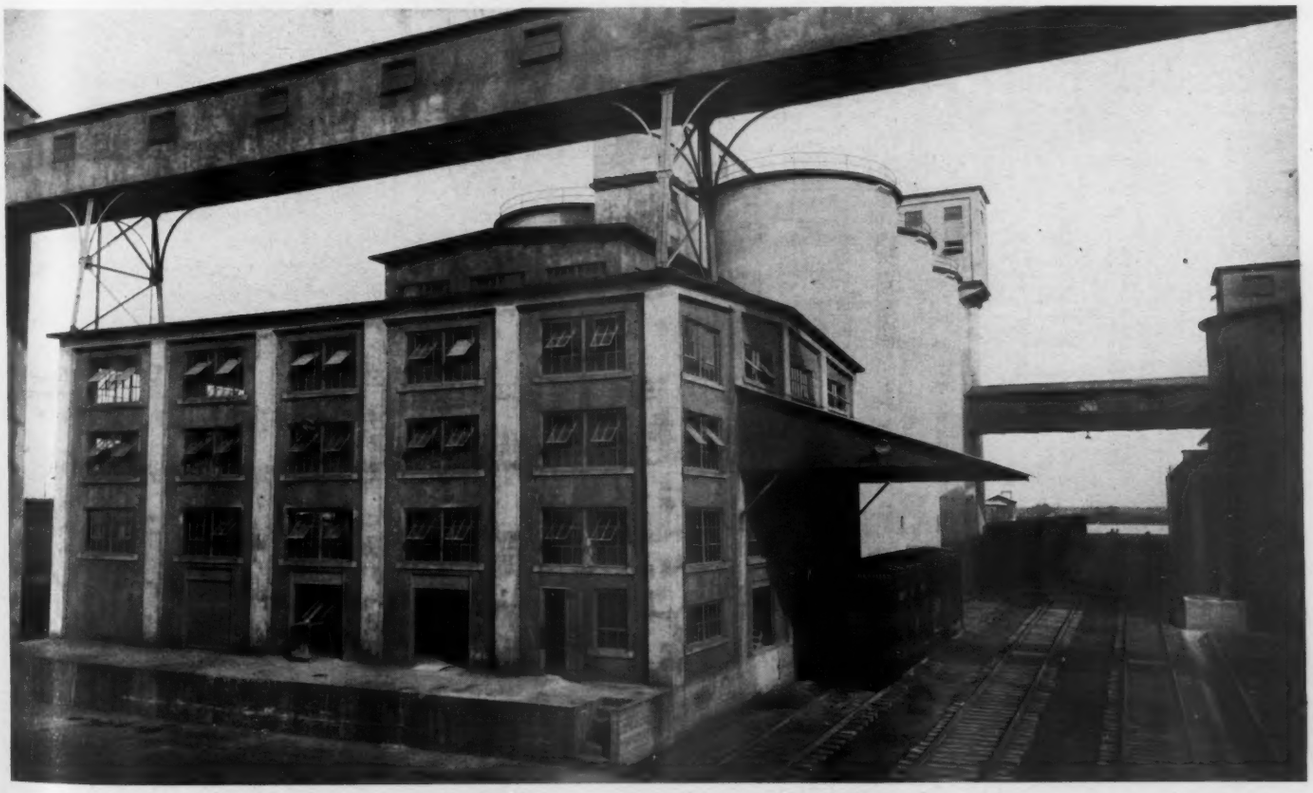
office and laboratory building, machine shop, coal mill, kiln house and dock

raises the clinker so that it is discharged into an 80-ft. Smidth "skipulter" conveyor set on the floor. The drive of the cooler is a 25-hp. motor and Link-Belt silent chain, and the drive of the skipulter is a 15-hp. motor and silent chain. The skipulter takes the clinker to a 60-ft. elevator which discharges into another skipulter that in turn discharges into either of two clinker silos.

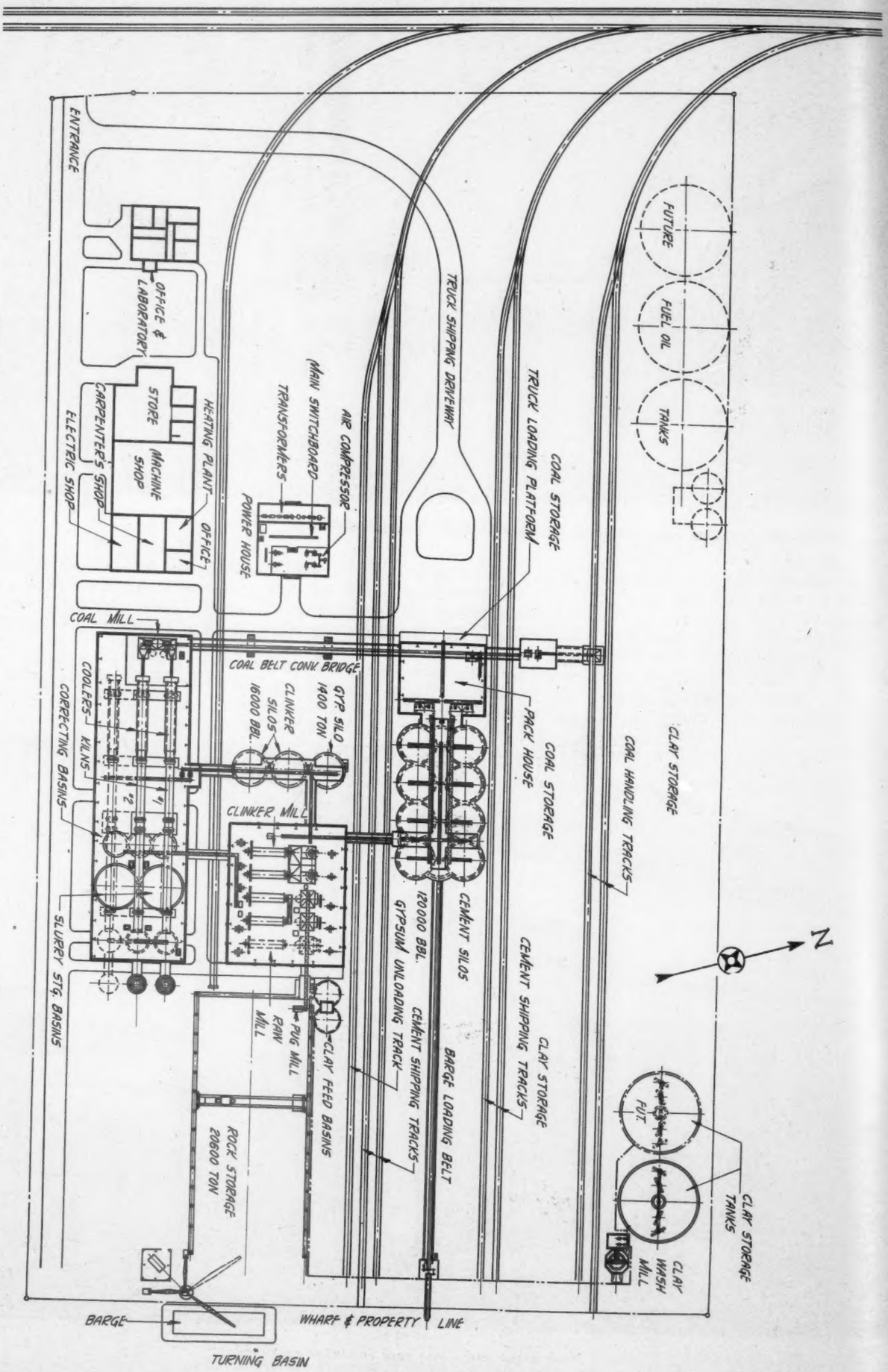
The International engineers do not think it advisable to store clinker out of doors. At the Louisiana plant the clinker silos are 32 ft. in diameter and 50 ft. high, and a third silo of the same dimensions, standing with them, is used to store gypsum. The recovery of clinker is by a 50-ft. elevator which lifts it to a third skipulter, 80 ft. long, that takes it to the grinding mill. The same skipulter takes the gypsum (from a separate 50-ft. elevator) when it is not conveying clinker.

Finish Grinding Department

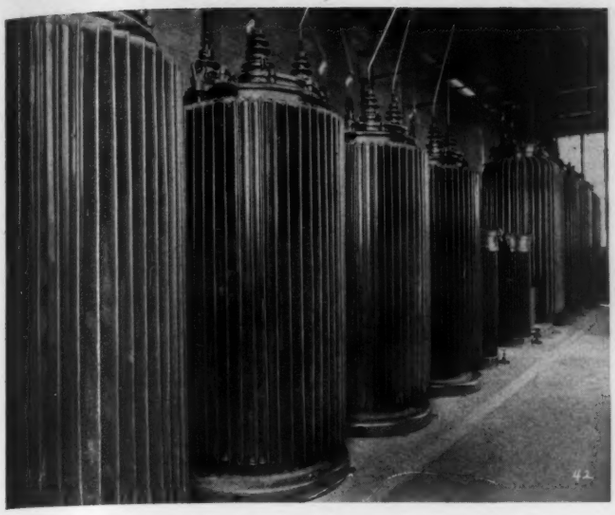
At the finish grind department, in the mill



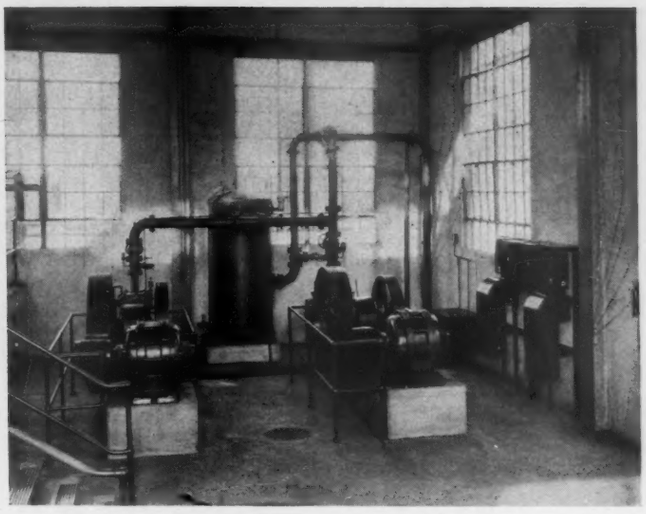
Pack house and silos; coal conveyor overhead



General plan, including machinery layout, of the plant of the Louisiana Portland Cement Co.



Transformer room back of power house



Air compressors in power house

house, the skipulter discharges clinker and gypsum into small bins set over two Bradley Hercules mills. These are of the latest type and are driven by 300-hp. supersynchronous motors, instead of the usual 350-hp. induction motors. The discharge falls into a dust chamber under the mills, in the bottom of which is a screw conveyor. The chamber and screw are under suction from a fan that exhausts into two standard Sly dust collectors placed near the roof of the mill building.

The screw discharges to an elevator that lifts the material to two tube mill feed bins, from which it is fed to the tubes by gravity and a screw feeder. The two tube mills are like those on the raw grind side, 7 ft. by 30 ft., and are driven by 600-hp. supersynchronous motors. They discharge into a 20-ft. screw conveyor that discharges into a 60-ft. elevator, and this lifts the cement to the overhead screws that fill the silos in the pack house. The charge for each tube mill is 105,000 lb. of 1-in. by 5/8-in. slugs, and the lining is "drag-peb." All the elevators and conveyors mentioned are connected with the suction of the fan of the Sly dust collectors and there is no dust whatever in the room.

There are eight storage silos, all 30 ft. in diameter and 76 ft. high, and bins called "star bins," made by connecting the silos. Each silo is fitted with a discharge hopper that feeds into a 9-in. screw driven by a

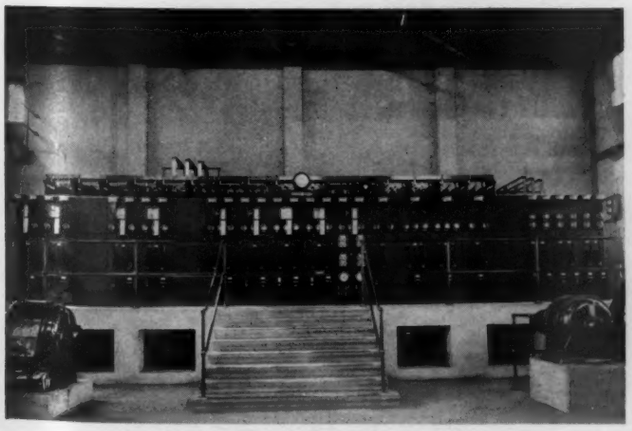
Clinker and gypsum silos

5-hp. motor and a James spur-gear speed reducer. These discharge to two 16-in., 150-ft. screws that take the cement to two 25-ft. elevators, and these lift it to two "screen screws." After passing the screens the cement falls into four packing bins, two for each elevator. The four Bates packers below them are of the 3-valve type.

The most interesting thing in the pack house is the simple ways the sacks are sent to four different points for different methods of shipping. If railroad cars are to be loaded, conveyor belts take the sacks from the packers to the cars. But these belts can be reversed, and if shipments are to be made by truck or ship, the belts discharge the sacks on a short roller conveyor that can be tilted. If it is tilted one way the sacks go on a conveyor that takes them to the truck loading platform; if tilted the other way, they go to the 600-ft. conveyor that takes them to the dock.

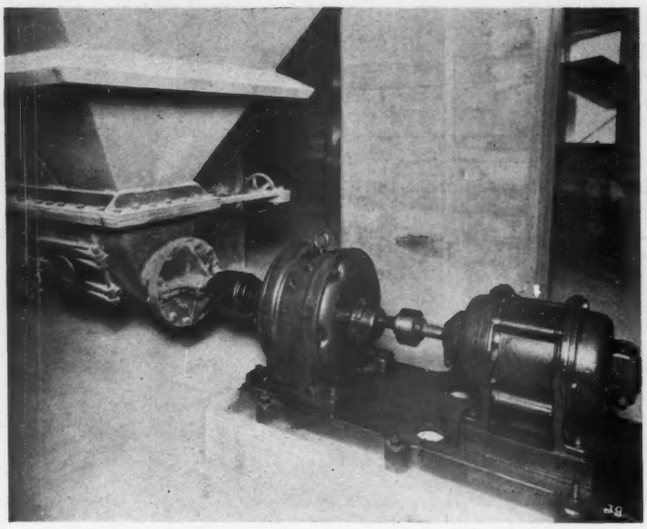
At the dock the sacks fall from the long conveyor on a 35-ft. boom conveyor that can be raised and lowered to accommodate itself to the height of the ship's side. It is balanced by a counterweight. The drive is from the pulley of the long belt.

The long conveyor is 30 in. wide and carried in a covered gallery on pressed steel idlers with Timken roller bearings. It is driven by a 20-hp. motor and a James spur-gear reducer with a 42 to 1 ratio.

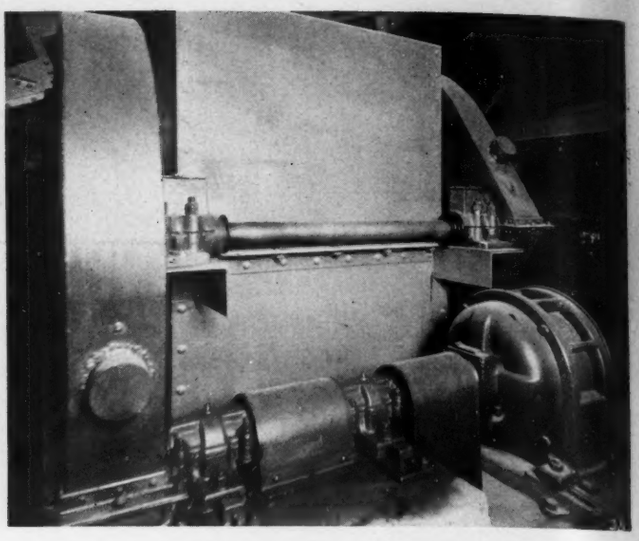


Main switchboard and exciters for large motors

Motor-generator sets and direct-current switchboard



Motor and speed reducer driving screw under silos



Standard elevator head and drive

The pack house contains a bag-cleaning wheel of the Louisiana company's own design, which has a screw feeder and an automatic discharge of cleaned sacks to an inclined belt conveyor, that takes them to a repair room on the upper floor. They are sorted there as they pass along on a sorting belt.

The pack house is dustless, except for a little dust that may come from handling sacks, as all the packers and the bag wheel are connected to the suction of a fan that draws the air to three Sly dust collecting units placed under the roof.

Electrical Equipment

The power system of this plant is considered to be one of the best which has been installed in a cement mill; and the power house, which contains the transformers, main switchboard, exciters and air compressors, is one of the important buildings. Power is purchased from the New Orleans Public Service Co., brought in at 13,200 v. and stepped down to 2300 v. for the larger motors and 440 v. for the smaller ones.

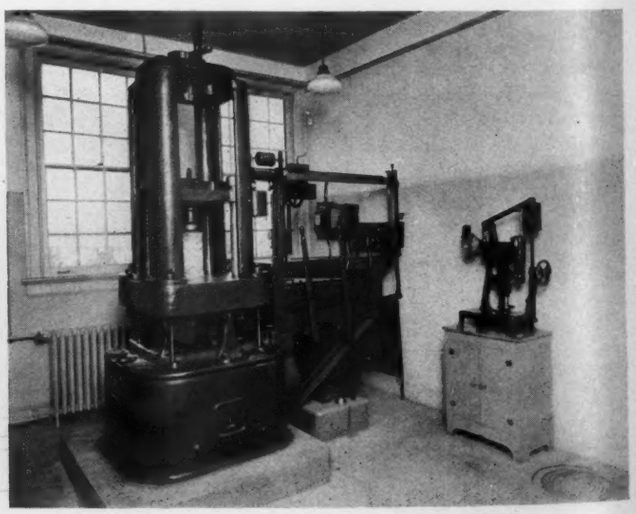
The transformers are in a separate room in the power house, four for 2300-v. and four for 440-v., also two auto-transformers which step the current down to 1100-v. for starting the larger motors and the exciters.

The main switchboard has eight panels for supersynchronous motors and two for the exciters, all on the 2300-v. circuit and all identical. There is one panel for the auto-transformers and one for the motors of the Fuller-Lehigh mills and two panels that are left blank for future installations. Behind the switchboard are the starting buses and the running buses and the disconnect switch, ahead of the oil switches, are protected with slate barriers. On every panel of the board there is a polyphase watt-hour meter, and on the panels for the supersynchronous motors there is an undervoltage relay, a time overturn relay, which can be set to kick out after any desired time; and on the large supersynchronous motor panels there are recording kilowatt meters. The field resistances for these motors are in a basement below the main switchboard.

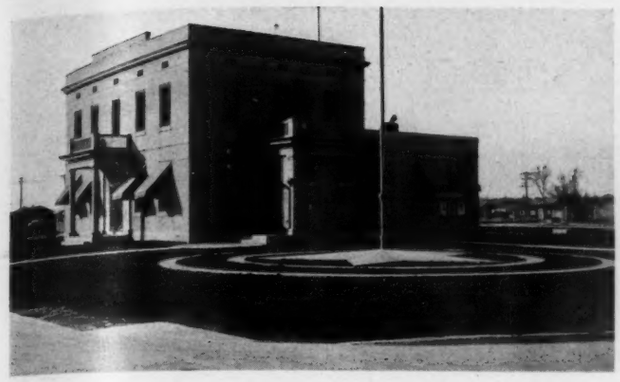
The operation of starting the supersynchronous motors is as follows: The power house is warned by a siren and a yellow light shows on the panel to be operated. This is answered by a green light at the motor, which is duplicated on the panel. In reply the man at the motor signals "go ahead" with the siren. The power house man then throws in the starting switch and watches the ammeter until it shows the motor is at speed, and then he closes the field switch and throws in the running switch, and gives the mill man a green light to show that the motor is ready for its load. No one but an electrician is permitted to start a large motor.

There are two 125-k.v.a. exciters in the power house to excite the supersynchronous motors and also to furnish current for the kiln feeder motors and coal screw motors. These supply current to a 60-cell storage battery which may be used for emergency operation of the main oil switches, relays, and lights on the switchboard. For lighting there are two 50-k.v.a. transformers which

Interior of chemical laboratory



Testing machine in physical laboratory



Office and laboratory building

Concrete garage

step the 440-v. current down to 110 v.

All the wiring in the plant is in lead-covered cables in conduits of vitrified clay for the outside and of black enameled steel for inside the buildings. These conduits all drain to a sump where the water is pumped out by an automatic pump. The motors not of the supersynchronous type are all of the squirrel-cage type, and those larger than 5-hp. are started by compensators. A typical starting set has a disconnect switch above, a fuse box below this and at the bottom the starting compensator with its stop button by which the relay is reset.

There are two 12x10-in. Ingersoll-Rand air compressors in the power house, driven by 75-hp. motors, and the air is piped everywhere it could be needed throughout the plant.

Plant Laboratory

The laboratory of this plant is beautifully equipped, all the furniture being of steel and the tables covered with "Alberine" stone. It contains everything needed not only for routine work, but for research, including a 200,000-lb. Olson compression machine. Briquettes are made with the "delimeter" and cured in a closet which is designed to keep itself at the same temperature at all times. Moist air for curing samples is obtained by bubbling air through a body of water.

Although no more is claimed for the product than that it is "standard portland cement," it would be unfair not to mention that it has shown rather exceptional qualities in use, including rapid hardening. Testimony on this point came, not from anyone connected with the plant, but from one or two large users who knew that the plant had been visited by the writer to prepare this article. It would also be unfair to close without some reference to the excellent feeling that exists between the men and those in authority, and the *ésprit de corps* that is shown in the work.

Personnel

The personnel of the Louisiana Portland Cement Co. is: President, H. Struckmann; vice-president, H. C. Koch; vice-president and manager, L. S. Thompson; treasurer, A. C. Harragin; secretary, H. H. Muehlke; general superintendent, A. D. Stancliff; superintendent, R. G. Sutherland; chief chemist, J. T. Bulman.

Status of the Lime Industry in the South

AT THE RECENT annual convention of Southern Builders' Supply Association, John E. Thayer, chairman of the lime committee, reported as follows:

"In the matter of finishing limes, the Southern Association has followed the lead of the National Association, who have asked lime manufacturers for:

"1. A 100% dealer distribution of finishing lime.

"2. Elimination of the broker.

"3. A single brand for each manufacturer.

"4. One price and the same terms to all dealers.

"The above requests are being given serious consideration by some of the larger manufacturers and producers of finishing lime.

"In view of the efforts of the National and the points of contact already established, your chairman has refrained from any remarks or correspondence that might muddy the water.

Gates and concrete road leading to the dock

Dealer Co-operation on Freight Rates

"It has been our pleasure to lend our co-operation to the manufacturers in the south and southeast in an effort to secure the elimination of the two minimums now in effect on interstate movements. At present the higher rates apply on lime in bulk or in bags, sacks or barrels, and are subject to a minimum of 15 tons. The other rates are 20% less subject to a minimum of 25 tons, and such lower rates apply only on lime in bulk or in sacks except intrastate within Alabama, Georgia and North Carolina. In those states, 25 ton rates apply in bulk or in sacks or barrels. An effort is being made to get the carriers to amend their 25 ton interstate rates to apply on lime in barrels, straight carload, or in mixed carloads with lime in sacks. Dealers prefer to buy lime in mixed cars, thereby reducing their stocks on hand.

"The lime manufacturers were successful in convincing the Southern Freight Bureau at their meeting in Birmingham on January 11 that they were entitled to the 80% rate on barrel lime in straight, or mixed cars of 25 tons, or more. This removed one of the most annoying shipping situations that has arisen in the industry. It will take some weeks to have this passed on by the various committees and made a part of the regular tariff. It is thought that these changes will be effective by March 1, or soon thereafter. This was secured by the co-operation of your lime committee, working hand in hand with the lime manufacturers.

"The situation in the southeast can best be summed up by a remark made by one of the manufacturers: 'It seems utterly impossible to make a start on any basis that is calculated to remain permanent. This reaction is caused in part by the attitude of some of the larger dealers, but more serious than this, we feel, is the tendency subscribed to in our industry which bends downward consistently rather than arousing ourselves to better and more constructive work, which would be helpful to all concerned."

Storage Plants for Sand and Gravel

Types of Storage and Handling Systems—Operation Costs of Various Types—Batchers and Batching Units

By Melvin E. Hartzler
Consulting Engineer, Chicago, Ill.

IT is often a problem to determine just how much material should be stored both at the plant and at the retail yard. The solution of this problem has a very real effect on the profits. The amount of material sold from a retail yard varies greatly, and if deliveries are not made on schedule or cannot be assured, a larger storage becomes a necessity for profitable business.

Some plants in retail yards have one average day's supply and are seldom out of materials, due to deliveries from their own plants, which can be kept coming in on schedule. Other yards have from three to eight days' storage, but even so they are often short of material for immediate delivery.

Material handling yard equipped with cranes delivering to ground storage or bins. The center bins shown are of the batcher type

The location of the plants from which the materials come, in relation to the yard, the amount of live storage in the plants and the time required for delivery of materials from plants affect the amount of storage required.

In most retail yards, the maximum day's demand should be the minimum carried in storage, and in some instances there are reasons why the storage should be three times the maximum day's demand. There are few yards, however, that have to carry three times their maximum day's demand.

It would be inadvisable to set a rule for the amounts of storage required in general, for there are too many variables, as indicated above. Each yard must become of necessity an individual problem in itself.

The kind of handling and storage system chosen is also a factor in the amount of storage required and therefore we must make a careful analysis of the following factors to make a decision on the amount of storage to be provided:

1. Average and maximum day's demand.
2. Source of materials or sources of material. Under this we should consider:
   a. Distance.
   b. How many times the cars must be transferred.
   c. How much storage at plants where materials are obtained.
   d. How many classes of materials are to be handled and the quantity of each.
   e. If retailers have their own cars.
3. Kind of storage and handling system.

Too large a storage increases handling costs. Too small a storage loses customers. The right size storage decreases cost and increases sales.

Too large a storage increases the costs: First, because of the additional investment on which must be charged a reasonable rate of interest; second, because the depreciation is increased; and third, because if the storage is unduly large it is unwieldly to handle and it will usually require more men to operate.

Too small a storage will lose business because it causes delays which are costly to the customer as well as to the dealer. It will also increase the cost of delivery, as trucks will be standing empty; this is the largest expense item of the dealer.

The right size of storage means more than sufficient materials; it means efficiency, no waiting customers, no waiting trucks, no idle men or equipment in yard, and it will cause every man of the organization to become more efficient and proficient as the results show.

Types of Storage

In general there are two classes or kinds of storage, ground and bin or silo.

By far the greater amount of stored material at present is carried in ground storage, but the tendency is swinging toward bin or silo storage for three important reasons. 1. Materials are more easily kept clean. 2. Truck loading is expedited. 3. Handling cost is reduced. However, nearly all plants that have bin storage have a supplemental ground storage for the heavy demand periods.

There are a number of different types of bins or silos, such as concrete silos, steel silos and portable steel bins. The concrete silo is a very substantial storage bin, but when the material strikes the sides they will wear away the same as steel bins do. As a rule the writer prefers the steel bins, and if there is any reason to assume the yard will be moved, he prefers the portable steel bins. The Blaw-Knox or Heltzel types are good examples; however, portable bins have too small a capacity unless used in connection with ground storage for most yards.

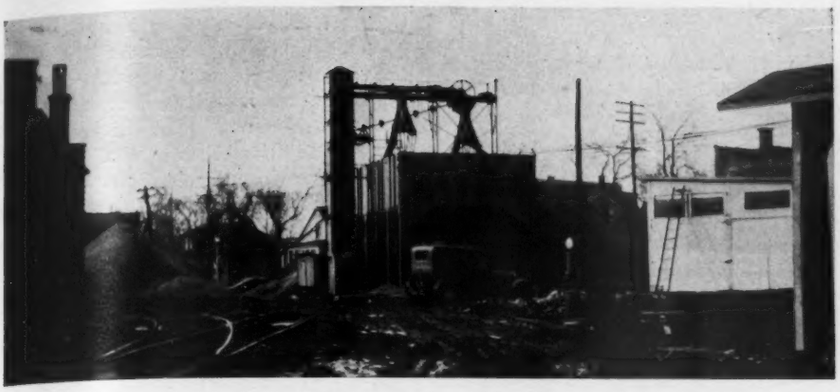
Silos for a permanent yard should have a capacity of from 45 to 250 cu. yd. The steel bin or silo of these sizes lends itself to alterations, addition and repair more readily and the cost is very little greater, and in some instances less than for a concrete silo of the same capacity, which is the reason the writer prefers steel bins.

When silos are filled by elevators it is best to use four silos for each elevator, each bin being set on the periphery of a circle, the center of which is the elevator discharge. The large diameter bins are best, as greater capacity is obtained for the amount of steel.

The type of storage which gives the best results is also dependent upon trackage condition, amount of ground available and handling methods.

Handling Methods

Some of the handling methods used in yards are:



Handling plant using belt conveyor-elevator system with storage bins

1. Locomotive or caterpillar crane with bins and ground storage.
2. Dragline scrapers with ground storage.
3. Silo elevator system.
4. Belt conveyor elevator system with either bins or ground storage.
5. Gravity entirely as by overhead tracks.
6. Wagon loaders.

The most widely used system is the locomotive crane with bins and ground storage. However, the silo elevator system is becoming more popular because it usually means lower handling cost.

The locomotive crane has a wide use for three reasons, its wide application, its low first cost and the fact that more users are familiar with them.

The drag scraper is particularly applicable for storing only one kind of material with low first cost and a low handling cost.

The belt conveyor and elevator system with silos, and the elevator system with silos supplemented with ground storage, are becoming more popular in spite of the larger first cost because they usually obtain a lower handling cost and they greatly expedite the loading of trucks.

An analysis of the kinds of materials, location of yards and the maximum, minimum and average demand must be made to properly determine what is the best handling equipment to be installed as well as for the amount of storage required.

If only building materials are handled, there are at least four different classes of aggregates, besides the cement, to be carried in storage, torpedo sand, bank or plastering sand, 1-in. stone or gravel, 2-in. stone or gravel and usually two or more other grades of material have to be cared for. This means the handling equipment and storage must make provision for at least four classes of material and possibly two or three more, and the demand for each class should be ascertained before deciding on the size and kind of storage to install.

It is evident that a locomotive crane must spend some of its time moving from one place to another to handle different classes of material, and the crane man is a mechanic who receives high wages, who is "indispensable" and who cannot be quickly and effectively replaced.

An analysis was made by the writer from two storage plants in service comparing the handling cost by a locomotive crane and ground storage and an elevator silo system. They were in Chicago, and the figures of cost and quantities handled were given by the owner. The data follows:

LOCOMOTIVE CRANE

Minimum demand in tons, per day	50
Maximum demand in tons, per day	800
Average demand in tons, per day	250
Year's total in tons	50,000

ELEVATOR AND SILOS

Minimum demand in tons, per day	50
Maximum demand in tons, per day	1,000
Average demand in tons, per day	400
Year's total in tons	80,000

INVESTMENT FOR THE LOCOMOTIVE CRANE SYSTEM

1. Locomotive crane	$ 9,000.00
2. Steel bins for truck loading	1,800.00
Total investment	$10,800.00

YEARLY OPERATING CHARGES

Interest on investment of $10,800 at 6%	$ 648.00
Depreciation in 10 years, one year	1,071.00
Repairs, oil and coal	409.00
Operator's wages	2,400.00
Two men to clean cars, wages	2,000.00
Total yearly operating expense	$6,528.00

50,000 tons handled for $6,528.
13.06 cents per ton.

INVESTMENT FOR ELEVATORS AND SILOS

Eight concrete silos at $2,000	$16,000.00
Two track hoppers	1,200.00
Two elevators	4,265.00
Two car pullers	1,272.00
Total investment	$22,737.00

YEARLY OPERATING CHARGES

Interest on investment of $22,737 at 6%	$1,634.00
$17,200 depreciation in 20 years	860.00
$ 5,537 depreciation in 10 years	553.70
Repair, oil and electrical service	412.65
No operator required	.....
Two men cleaning cars	2,476.00
Total operating expense	$5,666.57

80,000 tons handled for $5,666.57.
7.09 cents per ton.

There are other small items that must be added to the costs shown above to obtain the total handling cost exactly, but such items are common to both installations and hence were not included in this comparison.

Either of these systems could have handled more material, but the crane, under the conditions of its operation, was more nearly to its limit.

The fact that considerably more material was handled gave the lower cost to the elevator and silo system, but handling equal quantities it would still have shown lower costs than the crane system. However, there are plants of either kind that may be able to show costs that vary considerably from these figures. These two plants were owned by the same sand and gravel producer, who is also a retailer, and the comparison was made with the expectation of building a new storage plant. The new plant was designed on this showing for elevator and silo system, with a larger capacity than the older one.

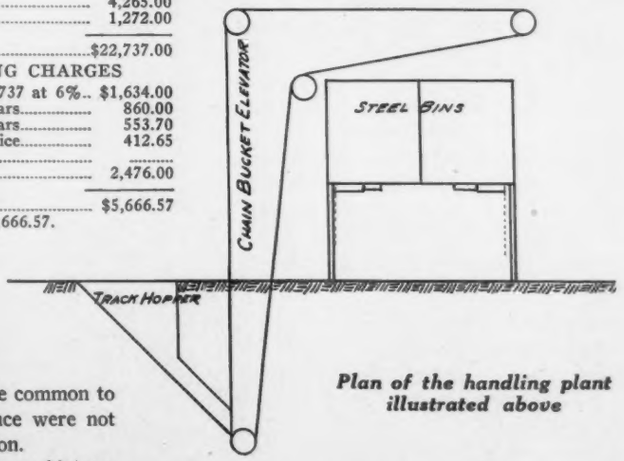
Well-Designed Loading System

One of the best designed retail yards the writer has seen for the quick despatch of trucks is in the Chicago district. This plant was designed by the owner who does not claim to be an engineer, but who is really a very capable one. The system is a "straight line production" system—the trucks come in at one end, receive their loading instructions and are weighed out at the other end. It requires but three minutes of the truck's time in the yard, unless the truck is to be loaded with two or more materials.

The time of three minutes is not the time of an individual truck but the time of the average of the trucks. The trucks come into the yard at the back drive and the driver can reach a phone from the seat of his truck and call his number to the dispatcher who instructs the driver what he is to load. The driver then loads his truck and drives upon the scales. While he was loading his number and truck weight has been placed upon the ticket and all that is necessary is that the gross weight and the net be placed upon the ticket and the driver is on his way.

This system is quite simple and works out very well where one kind and size of truck is used. Otherwise, it is necessary that the weight of each truck be instantly available for the dispatcher.

The driver can get sand and stone out in three minutes, but if he must take cement also a little more time is required. This yard has a silo elevator system of handling and has supplemental ground storage.



Plan of the handling plant illustrated above

There is another matter which affects the choice of a handling system in large cities, and that is the employment of union labor. I do not believe there is a single dealer who does not desire the open shop, and hence

they wish to remove the locomotive crane because it requires a union operator, who is more expensive than a laborer and who may be the cause of labor trouble. It should be added, however, that this class of mechanics are as a rule less likely to cause labor difficulty than many other employes.

Batching Units

Shall the dealer batch the materials? This is a question which will make some of the retailers jump and rave, others will smile and a few will say resignedly that "it is coming." One retailer has told the writer he would never do it until he was forced to, but he is using some batchers now.

Engineers are writing specifications requiring mixtures of the materials for concrete, which they know from their many tests should give the desired strength. However, these same engineers know that they must use a large factor of safety in their design because of the variation in the strength of concrete of supposedly the same mixes. This often makes a structure more massive than is actually required, and hence more expensive. Therefore, if we design some machines to accurately batch the aggregate we may with safety reduce the mass and the cost of the structure.

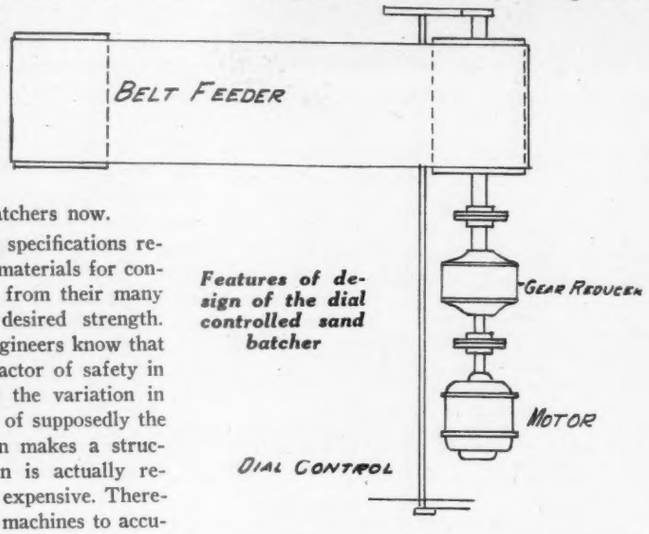
The strength of finished concrete is dependent upon a number of variables and to secure a more uniform strength we must secure a more uniform mixture. The cement of today is so nearly of a uniform quality that we should consider only the quantity of the cement and the quality and quantity of the aggregates; or, in other words, we need only to plan to meet the engineer's mixture specifications.

Contractors have tried conscientiously to secure these mixtures as nearly as possible, each in his own way, and usually they have not satisfied the engineer nor met the specifications. So each contractor, in the near future, must do one of two things, he must build a plant for each job to properly batch his material, or else he must buy his material already batched from some dealer who does batch the material to the satisfaction of the engineer.

It is evident that the dealer is justified in making an additional charge for this batching service, as it entails considerable additional equipment and some labor cost. It is also evident that the dealer should be able to batch the material considerably cheaper and much more accurately than the contractor for two reasons: first, one batcher installation will serve a number of contractors and will last for years, and hence he is justified in installing a larger and better layout than the average contractor would buy, and, secondly, his labor is usually cheaper.

Batchers

Many producers and dealers now are aware of this demand and are trying to meet the situation. The writer has recently designed a batcher plant, which is now in operation, for one of the larger companies in Chicago, which is almost entirely automatic and will make any desired mix and any size of batch. This company feels that it is justified in going to considerable expense in erecting a batcher plant which will satisfy the engineer's and architect's specification requirements. It is expected to enlarge their field for sales, insure better service and reduce the mix variation to the minimum which will assure a constant strength concrete.



Features of design of the dial controlled sand batcher

There are other companies doing this same thing, perhaps not on such a large scale, and under conditions not requiring such a high degree of accuracy. But there are enough to show that the old haphazard method of batching is soon to be discarded, a move which every engineer, builder and owner will welcome.

There are several types of batchers which are accurate and have been used to a considerable extent on paving work, usually by the contractor. But, as a rule, in the building construction line batchers have not found favor on account of the cost of the plant and the short time which the plant can be used at any particular location.

It is the writer's opinion that a weighing batcher is to be preferred to a measuring batcher. However, many engineers are of a different opinion, and hence a combination of the two might well be used to doubly assure satisfaction. As a rule, it costs considerably more to build a weighing batcher and no doubt this is one reason for the greater popularity of the measuring type.

A measuring batcher which the writer has designed, and which should give accurate results, makes use of a belt feeder over which the material flows in a uniform quantity. The control is made by the number of revolutions of the drive pulley. However, a constant flow from the bin must be assured in this, as in all measuring batchers.

The best batcher has not as yet been built, any more than the best of any other line of machinery. There is a great opportunity in this field. Batchers deserve an article to themselves, as they will make and are making a place for themselves aside from the other features of a storage plant.

Lime in Ohio

THE amount of liming materials sold in Ohio in 1927 amounted to 219,432 tons, divided as follows:

Agricultural limestone, including marl and carbonate forms, 189,636 tons.

Hydrated and burned lime, 14,796 tons.

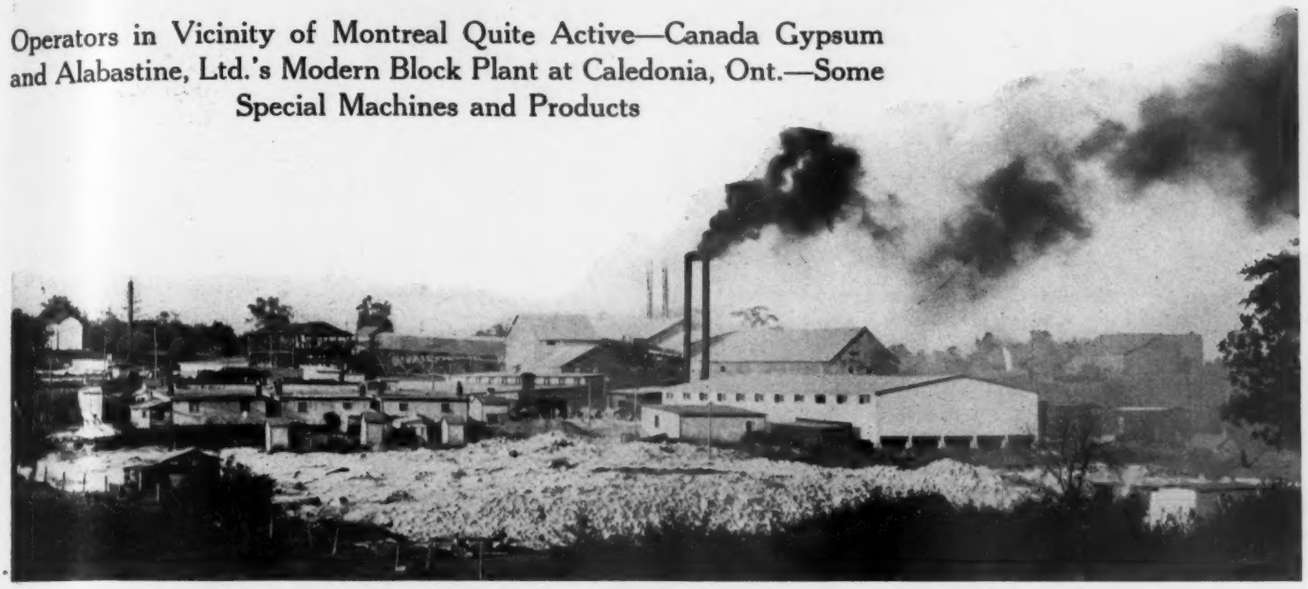
Other liming materials, including agricultural slag, 15,000 tons.

The tonnage of lime and limestone combined in Ohio from 1920 to 1926, inclusive, is as follows: 1920, 118,925; 1921, 97,951; 1922, 149,054; 1923, 170,052; 1924, 212,371; 1925, 236,015; 1926, 208,395.—*The American Fertilizer.*

Sand batcher drive comprising an electric motor and speed reducer. The size of the batch is regulated by the arm on the dial plate

Notes on the Rock Products Industries in Canada

Operators in Vicinity of Montreal Quite Active—Canada Gypsum and Alabastine, Ltd.'s Modern Block Plant at Caledonia, Ont.—Some Special Machines and Products



Caledonia, Ont., gypsum products plant of the Canada Gypsum and Alabastine, Ltd.

THE rock products industries in northeastern Canada are not so numerous but in some few instances compare very favorably in the matter of capacity with the larger operations in the United States. Principally the center of activities is in and around Montreal, which is quite natural, that city not only being one of the largest consumers but also the shipping center to all parts of Quebec the most populous province.

There are two cement mills at Montreal, the Montreal East plant of the Canada Cement Co., and the National Cement Co.'s mill. The latter plant, of 3000 bbl. per day capacity, was only completed a short time ago and was described in ROCK PRODUCTS, January 9, 1926. The Canada Cement Co. plant produces about 12,000 bbl. per day, an output equaled by few individual plants anywhere. Both mills use the dry process.

The largest gypsum products operator in Canada is the Canada Gypsum and Alabastine, Ltd., a recent combination of the Canada Gypsum and Alabastine Co., the Manitoba Gypsum Co. and the British Columbia Gypsum Co., which has wallboard and plaster plants at Montreal and Caledonia. The Montreal plant is quite recent and contains up-to-date equipment for the manufacture of lightweight gypsum wallboard. Some unusual machinery, such as a vertical French dryer, a kettle of company design and the use of a Raymond mill to grind and separate the calcined gypsum contribute to the novelties found in this plant. The rock for manufacture is purchased in part from the Canada Cement Co., the main source of supply coming from mines at or near Caledonia and a quarry at Mabon, N. S., owned and operated by the company.

An interesting feature not common to plants in the United States (except those on the Pacific coast) is the production of wallboard of many different sizes and thicknesses. These are all made on the same board machine and dryer, regulations of the equipment being changed for the size under manufacture. The export trade which takes a large part of the company's capacity demands these sizes, the ¼-in. thickness in particular. Shipments have been made to Vancouver by an all water route through the Panama canal. Exports to New Zealand and Australia are made at regular periods.

The Caledonia operations of the Canada Gypsum and Alabastine, Ltd., are largely the result of a series of consolidations and purchases dating back to 1917 when the Alabastine Co. and the Crown Gypsum Co. merged to form the Ontario Gypsum Co. A mine had already been opened in 1905; some of the output was sold to cement plants and the rest shipped to the calcining plant of the parent company at Paris, Ont. In 1919 the holdings of the Canadian Plaster Board Co., and in 1925, the holdings of the Ebsary Gypsum Co. were acquired, leaving the Ontario Gypsum Co. the only operating company in all Ontario.

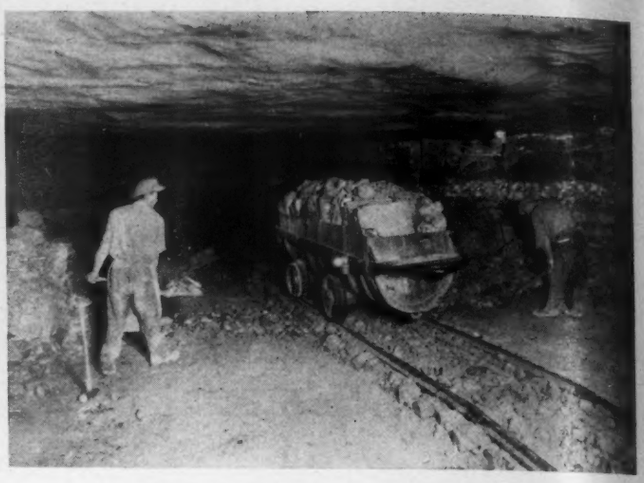
The gypsum beds lie at considerable depth below the surface so that mining is necessary. Practice is similar to coal mining, with the room and pillar system, the rooms being 20 ft. wide and pillars 12 ft. square. A slope 750 ft. long runs to the present working level about 90 ft. below the surface. The gypsum stratum is about 8 ft. thick and the yield is about 32,000 tons per acre.

All below-the-surface drilling is with Jeffrey electric drills driven by a 3-hp. motor at 106 r.p.m. Holes are loaded and shot with low-grade dynamite. The broken rock is loaded by hand to 3½-ton all-steel, end-dump cars which are hauled by mule to the foot of an incline where an electric hoist pulls them to the crushing plant. All the mine ventilating, pumping and lighting equipment is electrically driven. Cheap electric power is one of the features of the Ontario district, the province supplying power at a price of $28 per horsepower year.

The crushing plant contains a 20x30-in. jaw crusher in which the rock is reduced to 4-in. and a hammer mill crusher for making the ½-in. product used in the calcining departments. Some of the smaller crushed gypsum is sold to cement mills.

Rock for calcining is brought to a wooden storage bin which supplies a vertical French dryer. This dryer is similar to the one in the Montreal plant, in fact its installation at that plant was based on results obtained with it at this plant. After drying, the rock is crushed by a hammer mill and ground to about 20-mesh, the tailings reground in a Kent "Mexicon" mill and then carried to raw storage bins. Calcining is done in kettles of the company's own design. Stucco storage is much larger than usual on account of the variety of gypsum products made in addition to the wallboard and block.

Electric drilling at the Caledonia gypsum mine

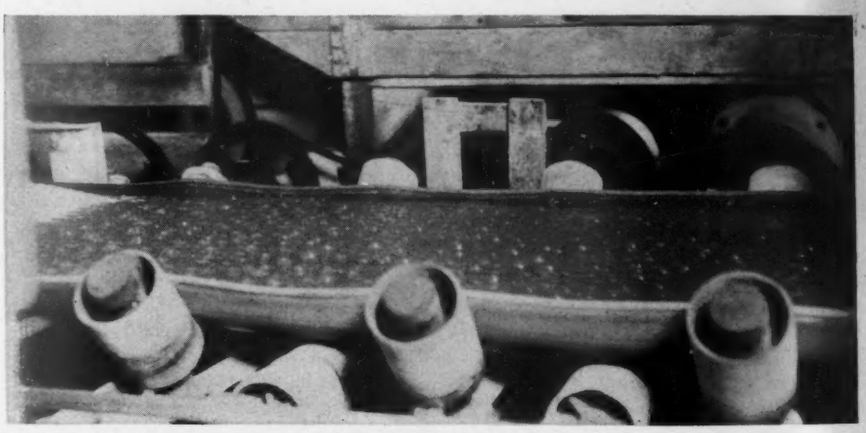


Miners hand-loading cars—Caledonia

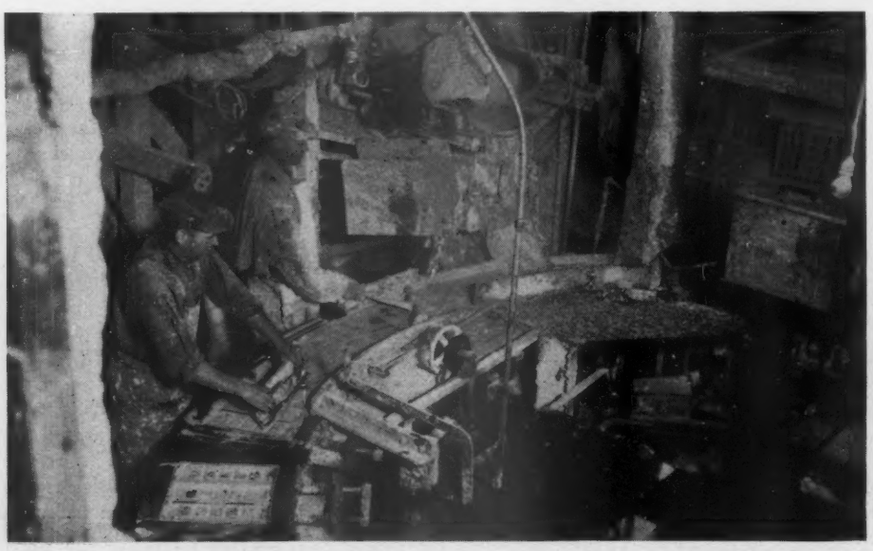
New Block Plant at Caledonia

Gypsum tile is one of the principal products manufactured and for this purpose an entirely new plant has been recently put in operation. The stucco is brought in by an elevator and conveyor from stucco bins in the main building and put in a stucco hopper of the usual type which feeds the soak belt. The gas forming ingredients, accelerator and wood fiber are added to the soak belt with the stucco. Individual amounts of each material are regulated to the speed of the soak belt, the whole being driven by a 15-hp. Westinghouse motor and a Reeves No. 2 variable speed transmission. Water is kept at a constant level on the belt by a hand-set valve. The temperature of the water is about 110 deg. F. and the time of travel of the stucco through the water section is about 50 seconds. The plaster is delivered in a hot state to a cross belt running to the mixer of the block machine. A short conveyor delivers a measured amount of colloidal agent in the form of foam to the cross belt with its load of plaster at regular intervals. A special form of beater is used to prepare the foam, the material as delivered resembling a mass of small soap bubbles. Its purpose is to act as a gas-entangling agent to keep the wet plaster porous before setting takes place. The mixer is a continuous type developed by the company.

The block machine is of the Gibraltar type furnished by the Gypsum Engineering and Manufacturing Co. and has been described in several issues of Rock Products. At this plant the machine is used to produce both solid and cored tongue and groove block. The tongue and groove features are popular with consumers in the territory, so very little smooth-edged block is made. For roof tile, the demand was for a wire reinforcement and under the regular operating methods this was somewhat difficult to make. By shifting the toggles of the block machine so as to advance the operation by one bay it was found reinforcement could be placed since the cores and division plates would be all the way up and ready to receive the load from the mixer.



Water section of the soak belt—Caledonia



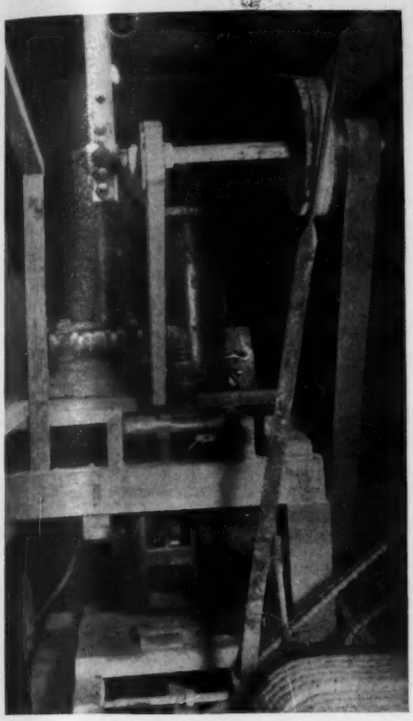
Looking down on the rotary block machine—Caledonia

The block machine is driven by a 15-hp. Westinghouse motor and Reeves variable transmission drive. It is controlled by an operator who also takes care of the mixer. The doors on the molds automatically open to allow the finished block to be taken out and then the workers swing it shut. As an added assurance that the door would be completely closed, a guide of iron pipe has been placed so that it forces the door to the latch as the machine rotates. All block are placed on steel trucks and pushed along

a track to the drying kilns, for drying.

Block Dryer

There are two triple-track kilns, 110 ft. long, with a total capacity of about 12,000 sq. ft. The old method of supplying heat to the kilns has been changed with consequent increase in drying capacity. Originally, the overshot method was used, that is, preheated



Foam beater and motor drive. The end of soak belt shows at the lower right—Caledonia

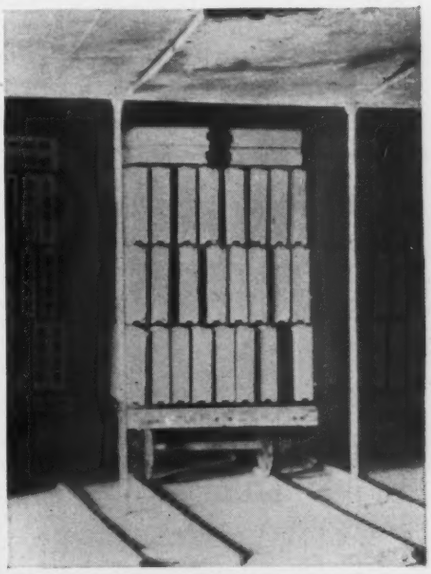
air was drawn from the wet end to the dry end of the kiln. Steam coils at both ends of the kiln were provided to heat the air. In the new method, both steam coils have been retained and the heat supplied to the wet end increased by introducing an additional quantity of preheated air, from a coke-fired furnace of the Dutch oven type. The fans have been removed from the ends and placed in the center so as to draw the hot air from both ends of the kiln and discharge the moisture and dust through a central vent. The advantages of this change are apparent —at no place in the kiln is the temperature so low that condensation of the moisture removed from the block can take place. It now takes from 18 to 24 hr., dependent on atmospheric conditions, for the block to pass through the kiln. The temperature at the green end is maintained as near to 290 deg. F. as possible and the dry end, a temperature of about 175 deg. F. is looked for. Two Bristol recording thermometers, one at each end of the dryer, have been installed.

Steam for the kilns is supplied from two 100-hp. boilers, one of which is a recent installation.

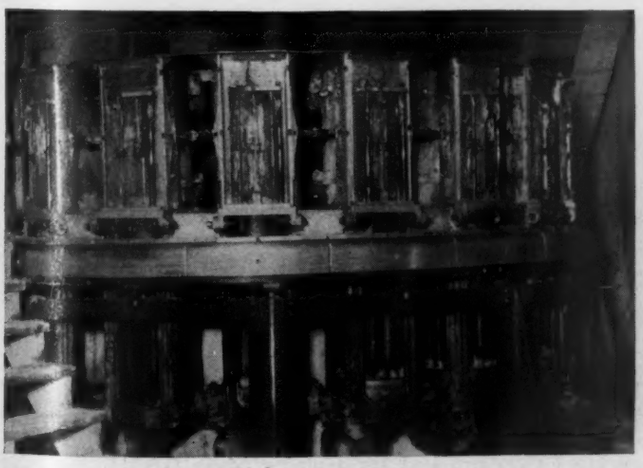
Interior of the roofing slab plant of the Canada Gypsum and Alabastine, Ltd.

Special Gypsum Block

Special designs of block such as roof spans are all made by hand. The stucco is gaged with water in a small power mixer, dumped to a bucket where wood fiber and set gypsum as an accelerator are added and the whole poured into a steel form. The roof spans are all reinforced with 1-in. steel channels, the reinforcement being put in the mold before pouring. After the span has set the steel form is broken up, the span removed, placed on kiln trucks and dried in the same kilns used for the block. All specialties have to meet rigid specifications for strength and so far the company says the span has far exceeded the requirements.



Cars of green block entering the drying kilns—Caledonia



Continuous automatic rotary gypsum block machine—Caledonia

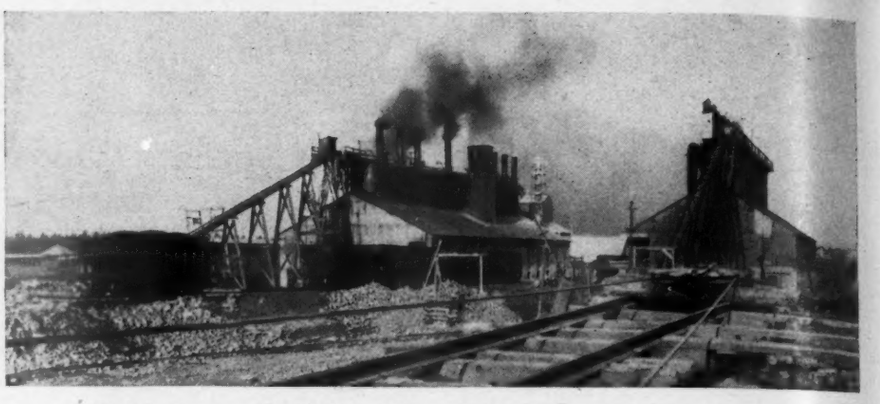
Taking off green block from the machine—Caledonia

All kinds of gypsum plasters are made at this plant, including several based on the "Insulex" patents for which this company has the sole Canadian rights of manufacture.

A Large Lime Producer

The largest producer of lime in Quebec is the Standard Lime Co. at Joliette, 60 miles north of Montreal. There are two batteries of 10 kilns each, all coal-fired, using the Eldred CO_2 recirculation system. Several of these kilns have been recently rebuilt with some of the more modern features. All are 55 ft. high, 12 ft. outside, 5½ ft. inside diameter, and produce about 225 tons per day or about 11 tons per kiln. At the plant there is a hydrate unit for making mason's hydrate, for which a Kritzer hydrator is used. A new 8-kiln plant has been recently put in operation by the company at St. Marc.

The activities of the Standard company are not confined entirely to lime, for it operates a crushing plant of considerable size. At the quarry, about 1500 tons per day are removed, of which 700 tons are used in making lime and the remainder for commercial crushed stone. The quarry has been developed with a circular face about 2000 ft. long and about 60 ft. high. A bench below the quarry floor is being opened with a 25-ft. face. Three steam shovels, one Bucyrus and two Marion, are used for digging and loading the rock to 8-yd. quarry cars. Two steam locomotives haul the rock to the crushing plant about a half-mile away. The crushing plant has a 36x42-in. Farrel-Bacon jaw crusher for primary crushing, a secondary crusher, two Austin 20 ft. by 48 in. rotary sizing screens and the usual conveying equipment. The spalls from the jaw crusher, 5-in. and under, are used for crushed stone, the larger sizes being utilized in the kilns. Other limestone products made include asphalt filler and agricultural limestone, a separate pulverizing plant, Bonnot equipped, being maintained for their production.



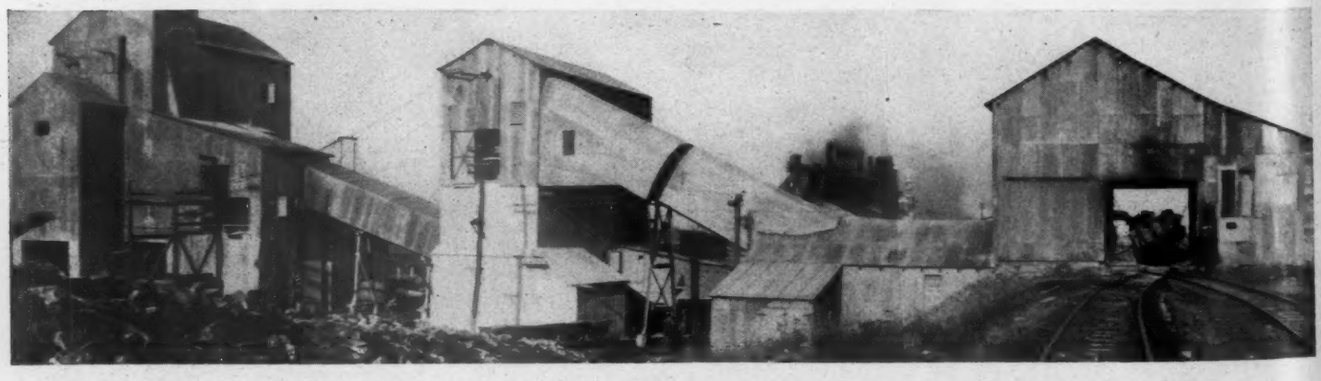
Double battery of 10 kilns each, Standard Lime Co., Joliette, Que.

Besides this the company operates a large sand pit, a sand-lime brick plant at Montreal (described completely in ROCK PRODUCTS, December 25, 1926) and a Blue Diamond process mixed mortar plant at Montreal. E. E. Lepine, manager of the Standard company, is also investigating the possibilities of ready-mix concrete trucks such as described in ROCK PRODUCTS.

The quarry of the Standard Lime Co. has been developed over a period of years for both crushed stone and kiln stone

Alsatian Potash Production

THE DEVELOPMENT of the Alsatian potash mines since 1918 has been very rapid, the production of crude salts having increased from 591,471 metric tons in 1919 to 1,664,605 in 1924, 1,926,346 in 1925, and 2,317,541 in 1926. In November, 1927, there were extracted from these mines 192,500 tons of raw sylvinite, as compared with 217,500 tons during November of 1926, bringing the total production for the first eleven months of 1927 up to 2,128,650 tons, as against 2,094,800 in 1926, representing an increase of only a little more than 1%, in marked contrast to the phenomenal expansion of previous years. Production of commercial salts for the eleven months' period of 1927 amounted to 1,136,200 tons (342,200 tons K_2O), an increase of a little more than 3% over the 1926 period.—*The American Fertilizer.*



Screening and recrushing plant (left), primary crushing plant (center), and car-dumping house (right), Standard Lime Co., Joliette, Que.

Technology of Gypsum Plaster Materials*

Part II—Properties Effecting Setting Time of Gypsum —Empiric Tests With Various Limes for Strength

By Otto Fr. Honus

A SHORT TIME afterwards an extensive report was published by Budnikoff (*Rep. of Polytechn. Inst. at Ivanovo-Voznesssensk,* vol. 8, p. 32; also comp. *German State Patent* 420,957 Kl. 80b of Jan. 26, 1924, and 432,542 Kl. 80b of April 15, 1924), together with his collaborators S. Syrkin, Sokolov and Levin, on the ability of anhydrous gypsum to react with water and on the tensile strength, when hardening takes place under the influence of foreign admixtures. According to this, 2 gm. finely ground anhydrite (passing 4900-mesh sieve) were intimately mixed with a small quantity of a "catalyzer." To this 1.5 c.c. water was added and the sample placed under a bell jar for 7 days together with a pan of water. The mass thus saturated with water vapor was dried for a week at a temperature of 35 to 36 deg. C. A new weighing recorded the quantity of water which reacted with the anhydrite. Table 1 gives the results of tests of the effectiveness of different catalyzers.

TABLE 1. EFFECTIVENESS OF DIFFERENT CATALYZERS

Catalyzer	Quantity of catalyzer Per cent	Absorption of water Per cent
HNO_3	2.0	2.39
$Na_2HPO_4 \cdot 2H_2O$	6.0	2.23
$NaHSO_4$	1.5	13.25
CaO	3.0	2.0
$MgSO_4 \cdot 7H_2O$	6.5	1.98
$MgCl_2 \cdot 6H_2O$	9.3	1.42
$ZnCl_2 \cdot 2H_2O$	1.0	3.53
$Al_2(SO_4)_3 \cdot 18H_2O$	3.0	2.14

Hydration is followed by hardening, during which process crystals of dihydrate are formed. The admixture thus separates in the form of a crust on the plaster, a phenomenon previously observed in similar tests. The admixture virtually acts as a catalyzer and at the end of the process is in the same state as at the beginning.

Table 2 shows the rate of hardening and the tensile strength of the hardened material. Natural or artificial anhydrite is ground and sieved as above, mixed with the catalyzer and with 35% (by weight of anhydrite) water.

Contrary to previous experience, sodium acid sulphate has a very beneficial effect on hydration as well as on the strength. The anhydrite cement with this admixture is dense, sound throughout the tests for consistency of volume in air, water and steam bath (120 deg. C. for one and one-half hours) and is resistant to moisture. The 1.3 sand mortar mixed with 20% water yields a tensile strength of 31.5 kg. per sq. cm. after 7 days and 33.6 kg. per sq. cm. after 28 days.

TABLE 2. RATE OF HARDENING AND TENSILE STRENGTH OF HARDENED MATERIAL

Catalyzer	Quantity used (in Pct.)	Tensile Strength—kg. per sq. cm.— 3d.	7d.	28d.	60d.	Time of Set
CaO†	0.5	12.6	39.95	41.5	.....	2 hours
NaOH	1.0	32.0	29.75	40.5	.....	
Portland cement	10.0	4.5	4.5	27.0	14.2	
Chrome alum	2.0	34.5	38.45	37.5	.....	Slowly
$(NH_4)_2SO_4$	1.0	13.0	12.70	41.5	.....	
Na_2SO_4	3.0	15.5	8.20	38.0	.....	
$FeSO_4$	0.125	11.5	12.5	12.3	.....	
H_2SO_4	1.0	12.0	14.3	36.5	.....	Quicker than $CaSO_4 \cdot 0.5H_2O$
HCl	2.0	8.5	7.5	17.0	.....	
Tartaric acid	1.0	7.8	23.5	36.3	.....	Slowly
$NaHSO_4$	1.0	29.5	32.8	49.1	.....	10-15 min.
$KHSO_4$	2.0	27.5	33.15	50.5	.....	

†Mixed with 25% water.

Zement (1927).

PART I of this series appeared in the February 18 issue with a discussion of the effects of calcination temperatures on the properties of gypsum, and the nature and utilization of anhydrated and dead-burned gypsum.—The Editor.

To test the effect on strength of the heating temperature of the raw material, natural alabaster ($CaSO_4 \cdot 2H_2O$) is dried for 2 hours at 200, 300, 400, 500, 600 and 700 deg. C. It is then pulverized and mixed with 1% $NaHSO_4$. The tensile strength of the resulting product is given in Table 3 for 28 days.

TABLE 3

Heating temperature of gypsum (deg. C.)	Tensile strength kg. per sq. cm.
200	28.5
300	11.8
400	38.5
500	49.1
600	42.0
700	30.0

Gypsum as well as anhydrite can be used as original material for anhydrite cement. The most effective catalyzer is sodium acid sulphate, which is a waste product of the nitric and hydrochloric acid industries. When starting with natural anhydrite, the manufacture of anhydrite cement becomes less costly and permits the hope of a future for the anhydrite cement.

Effect of Admixtures on Setting

According to Schott (*Dinglers Polytechn. Journ.,* vol. 1926, p. 357) the setting of gypsum is accelerated by an admixture of potassium sulphate. Even unburned gypsum becomes hard under these conditions. Contrary to the evidence published by Budnikoff and his collaborators, he claims that sodium salts are indifferent to the reaction. He states, however, that waterglass produces immediate set of gypsum and that the salts added are eliminated from the gypsum during drying, the latter observation having been also independently discovered by Budnikoff. Admixtures, such as selected by Schott, yield strengths like those of ordinary gypsum plaster. Wylde (*Deutsche Ind. Ztg.,* p. 108, 1866) obtains strengths higher than the latter when using waterglass together with potassium sulphate or carbonate.

While pure gypsum plaster is not resistant to weathering, a slow-setting gypsum burned at high temperatures may under the action of certain admixtures (sharp edged sand and larger stone particles) acquire in a relatively short time the strength, durability and resistance to weathering of a good hydraulic cement. An old plant in the Harz district manufactured at one time a cement from 1 part strongly calcined gypsum, 1.5 parts sharp-edged sand and blast furnace slag. The pulverized mixture was used for ornamental figures, tombstones, floor slabs, foundations, and was also suitable for pouring houses.

Other hardening aids, such as borax, alum, iron, zinc and copper sulphates, as well as other salts, have been suggested. According to Greenwood (*Verhandl. d. Ver. f. Gewerbefleiss,* p. 179, 1843) and Elsner (*Dinglers Polytech. Journ.,* vol. 91, p. 356), the lumps of calcined gypsum or the powdered gypsum, coming from the calciner, are treated with an alum solution, whereupon they are dried and again calcined at a uniform red heat (about 400 to 500 deg. C.). The product is mixed with an alum solution containing 1/13

to 1/12 parts by weight of alum. Gypsum produced in this manner hardens more slowly and in time acquires the hardness of alabaster or marble, thin sections being transparent. Even immersion in boiling water for longer periods does not result in loss of hardness. The time of set of such gypsum is about 55 to 60 minutes. An admixture of 1/16 parts alum or 1/16 parts sal ammoniac per 1 part gypsum results in accelerated hardening (*Dinglers Polytechn. Journ.*, vol. 104, p. 158). Gypsum hardened with alum is called Keene's alabaster or marble cement or alum gypsum (*Tonind. Ztg.*, p. 124, 1882).

An admixture of potassium acid sulphate or diluted sulphuric acid produces hardening effects similar to those obtained with alum, according to Landrin. Tests made by the latter were the precursors of Budnikoff's series. Heinemann (*D. R. P.* 25, 993) colors natural gypsum and increases its hardness with calcium chloride, also with a solution of magnesium sulphate, as well as glue and tannic acid solutions. According to Dennstedt (*Ber. Deutsch. Chem. Ges.*, 18, p. 3314, and *Tonind. Ztg.*, No. 22, 1886) greater hardness of gypsum may be obtained by adding up to 50% SiO_2 dust or mixing it with diluted solutions of metallic salts, such as Zn, Cd, Cu, Fe, Co, Ni, Al and Mg, and subsequently treating the product with a hot barytes solution.

Considering the above methods of manufacture in the light of the progress achieved by the industry to date, many of them appear too complicated and do not warrant sufficient strength of the product to comply with present requirements. However, other gypsum mortars, such as described by Hartner and Budnikoff, yield satisfactory results. Haberstroh (*Die Baustoffkunde*, vol. 1, p. 64, 1922) claims that gypsum mortars, obtained by calcining gypsum at over 1000 deg. C., yield compressive strengths of 200 to 250 kg. per sq. cm.

Empiric Tests Used

As we have every possibility of bringing this branch of the industry to full development without great difficulty by a rational exploitation of native gypsum resources, the author decided to supplement the scientific evidence expounded above by purely empiric tests. Their results may be generally designated as satisfactory.

Y. D. Scott (*Scientific American*, Aug. and Dec., 1871; *Engineer*, Dec., 1871; *Eng. Mining Journ.*, Jan., 1871) may be called the precursor of the tests to be described. Schott (*Dinglers Polytechn. Journ.*, vol. 209, 1873, p. 35) also studied the phenomena produced by gypsum in slaking of lime. He established the range limits of the hydraulic effect of lime-gypsum mixtures. In connection with the author's series, Schott's tests were repeated. In all tests gypsum and lime were mixed in the proportions given in Table 4 with 12 c.c. water to 20 gm. samples and were placed under water when an evolution of heat was felt.

TABLE 4. HYDRAULIC LIMITS OF GYPSUM-LIME MIXES

Ref. No.	$CaSO_4$—Content of the lime-gypsum mix, Pct.	Evolution of heat began after	Behavior in water
1	0.5	almost 5 min.	Dissolves to a paste
2	1.0	5 min.	Stiff paste
3	1.5	.....	All harden under water
4	2.0	6 min.	
5	2.5	.....	
6	3.0	10 min.	
7	5.0	20 min.	
8	10.0	25 min.	
9	20.0	30 min.	
10	25.0	38 min.	
11	30.0	.....	
12	50.0	.....	
13	60.0	Up to one hour	
14	75.0		
15	90.0		Decomposes
16	95.0		Decomposes at once
17	99.0		Remains a paste

With the exception of samples 1 and 2, which crumbled and formed a paste, samples 1 to 6 maintained their strength and hardened under water. The following samples 7 to 14 with increasing gypsum content showed increasing softness of the mass. Sample 15 crumbled and samples 16 and 17 showed no set but formed a loose paste. Schott made use of this test evidence in his later tests by heating his lime-gypsum mixture of the above proportions to over 1000 deg. C. The author followed Schott's example and, in addition, increased the lime content, thus producing even higher strengths than those of Schott's cement.

After having thus established the range limits of practically useful products, the actual test series of empiric nature was begun.

Lime hydrate $Ca(OH_2)$ was mixed in the proportions given in Table 5 with the gypsum byproducts of the fluoric acid industry, which are not hydraulic in their original state, and with an aluminosilicate, obtained as a waste product mainly in coal-washing plants. This waste product is referred to below in Table 5 as "Waschhalde." The mixture was pulverized, passed through the 4900-mesh sieve, and its chemical and molecular composition was determined. It was then mixed with water and sand to a 1:3 mortar and made into 70 cubes, each 70 m.m. on a side. The results are tabulated in Table 5.

Increased gypsum content reduces the time of set. The strength values in Test Series 2 and 3 are considerably lower than those of Series 1. No explanation can be advanced why the compressive strengths of Series 2 and 3 remain practically the same in spite of variations in the lime and gypsum content. No appreciable temperature rise was observed when water was added. The specimens are all sound in water. Comparing these results with those of G. Redgrave (*Dinglers Polytechn. Journ.*, vol. 209, p. 36, 1873), who obtained strengths of 21.2 to 21.7 lb. per sq. in. with a selenite mortar (burned lime + 5% gypsum) of a 1:3 mix at the age of 35 days when cured in air, a notable increase in strength is recorded.

Test Procedure

Different varieties of gypsum and limestone were used in the tests which followed. The procedure was as follows:

1. Pulverizing of the raw materials mixed in certain proportions by weight.
2. Addition of water, shaping of the stiff paste into balls and pats; drying of same.
3. Burning of the dried materials at 600 to 850 deg. C.
4. Grinding of the product of burning, mixing of same with sand in definite proportions and with addition of water. Making of 70 m.m. compression cubes.

The chemical composition and source of gypsum and limestone used in the experiment are given in Tables 6 and 7.

TABLE 6

Chemical composition	Residual gypsum from fluoric acid manufacture	Troppau gypsum	Oxidized residue from soda ash manufacture
$CaSO_4$	95.0	78.2	56.44
Free SO_3	1.2	.....	.....
$CaCO_3$	.....	3.7	11.3
R_2O_3	Spuren	3.5	2.9
SiO_2	.....	2.4	6.3
MgO	.....	0.9	0.4
H_2O	2.4	12.5	20.7

TABLE 7

Chemical composition	Limestone from Stramberg	Skalice	Setzdorf
$CaCO_3$	96.9	92.4	89.3
SiO_2	1.9	5.91	7.0
R_2O_3	0.96	1.44	1.96
MgO	0.31	0.42	1.07

Table 8 gives the weight and molecular percentages, as well as the molecular ratio of limestone to gypsum and *vice versa*. In all these computations such foreign constituents as R_2O_3 and SiO_2 were not taken into account to simplify the work. Undoubtedly, these substances have some effect on the hardening of mortar.

Direct grinding of a mixture of gypsum and lime hydrate, as well as of gypsum, lime hydrate and of a silicate, results in products

TABLE 5.—PROPERTIES OF PLASTERS MADE FROM HYDRATED LIME-RESIDUAL GYPSUM-RESIDUAL ALUMINO SILICATE MIXES

	Chemical Composition							Method of Curing				
	$CaSO_4$ %	$Ca(OH)_2$ %	SiO_2 %	R_2O_3 %	C+ org. mat. %	Mol. ratio $CaSO_4$:$Ca(OH)_2$:SiO_2:R_2O_3	Mix	Time of set, hr.	Moist closet days	Water curing days	Outdoor curing days	Compressive strength
Experiment 1												
100 g lime hydrate								14	1	14	15	21.5
50 g Waschhalde*	19.2	47.6	17.9	8.3	5.0	1:4.55:2.12:0.34	1:3	14	1	14	49	44.0
35 g residual gypsum												
Experiment 2												
100 g lime hydrate												
50 g Waschhalde*	27.1	41.7	15.8	7.3	4.9	1:2.82:1.32:0.28	1:3	12	1	14	49	30.0
60 g residual gypsum												
Experiment 3												
100 g lime hydrate												
50 g Waschhalde*	39.5	34.8	13.3	6.1	3.7	1:1.62:0.76:0.16	1:3	10	1	14	49	31.0
100 g residual gypsum												

*Alumino-silicate waste from coal-washing.

TABLE 8

Test No.	% by weight $CaCO_3$:$CaSO_4$	Mol. percentage $CaCO_3$:$CaSO_4$	Mol. ratio CaO:$CaSO_4$
1	100: 30.2	144.91: 32.17	1 :0.2221 4.5 :1.0
2	100: 42.35	144.91: 45.12	1 :0.3113 3.21 :1.0
3	100:116.8	144.91:124.43	1 :0.8588 1.164:1.0
4	100: 46.53	144.91: 49.56	1 :0.3421 2.92 :1.0
5	100: 26.25	144.91: 27.96	1 :0.19375 5.18 :1.0
6	100: 32.36	144.91: 34.48	1 :0.2379 4.2 :1.0
7	100: 39.33	144.91: 41.91	1 :0.2891 3.45 :1.0
8	100: 55.71	144.91: 59.36	1 :0,4096 2.44 :1.0
9	100: 28.21	144.91: 28.7	1 :0.2069 4.85 :1.0

which yield but low strengths when tested as 1:3 mortar in accordance with standard procedure. In some cases water curing was even found to be detrimental to such mixtures. The conditions are totally different when limestone and gypsum are mixed with a possible admixture of an alumino-silicate in the proportions by weight given in Table 9 and calcined at 600 to 850 deg. C.

TABLE 9

Test No.	Limestone origin and quantity gm.	Gypsum origin and quantity gm.	Curing Conditions: Mortar mix	Moist closet, days	Water, days	Air, days	Compressive strength kg./sq. cm.	Initial set	Time of set
1	Skalice 70 g.	+ Troppauer 25 g.	1:4.4	1	6	31	142.1		
2	Skalice 170 g.	+ AuBiger 70 g.	1:3.4	1	6	37	142.8	From 10 to 20 minutes	From 1½ to 2½ hours
3	Stramberger 80 g.	+ Petrovie 160 g.	1:4.0	1	6	51	77.0		
4	Setzdorfer 160 g.	+ AuBiger 70 g.	1:3.2	1	6	51	172.7		
5	Setzdorfer 100 g.	+ Troppauer 30 g.	1:3.6	1	6	29	157.7		
6	Stramberger 150 g.	+ Troppauer 60 g.	1:3	1	6	20	201.0		
7	Stramberger 100 g.	+ AuBiger 60 g.	1:3.22	1	6	24	110.0		
8	Setzdorfer 75 g. Kieselton 150 g.	+ AuBiger 50 g.	1:3	1	6	20	91.5		
9	Skalice	Troppauer	1:3	1	6	9	84.0		

Chemical Reactions in Pulverized Mixtures

There exists a current belief that chemical reactions do not take place or take place very slowly in pulverized mixtures of solids. Table 5 demonstrates that even at ordinary temperature a chemical reaction must have taken place, resulting in the formation of calcium silicate and basic calcium sulfate. These actions do not take place in the case of easily fusible carbon compounds. The slowly fused oxides, sulfates, carbonates, sulphides, etc., react with each other under proper temperature conditions far below their point of fusion with considerable activity. Salts, such as $CaSiO_3$, are thus formed from basic oxides CaO and others, as well as carbonates (SiO_2); basic salts, such as $CaSO_4 \cdot CaO$, are the result of the reactions of basic oxides and salts. The direction of the reaction between two crystalline compounds is that resulting in heat evolution.

When two or more crystals, capable of reacting with each other, such as SiO_2 and $Ca(OH)_2$, or CaO, $CaSO_4$ and SiO_2 are brought together at ordinary temperatures, there probably is formed a coating of calcium silicate or of basic calcium sulfate, or of both of a thickness of one molecule. Unless heated, the reaction stops, as the atoms of the calcium silicate or basic calcium sulfate coating, as well as those of the silica, lime and gypsum crystals revolve around their respective centers. Raising the temperature to 600 to 850 deg. C. produces a peculiar activity among the crystals. Molecules or groups of atoms (ions) begin to exchange places, the molecular coating of the product of reaction no longer prevents certain atom groups from passing through and the reaction becomes apparent. The temperature of the initial displacement or of the initial inner diffusion is of fundamental importance for all reactions in the solid state. This is of practical interest, as certain reactions taking place but slowly at ordinary temperatures may be greatly accelerated by heating above certain temperatures, a process which has an intimate relation to the increase in the strength of the products of calcination.

The tests show that the general assumption, according to which reactions in the solid state at ordinary temperatures take place so slowly, that they are of no importance in practice, is erroneous. For even in the raw ground materials are found products whose hydraulic properties are of note and whose strengths are higher than those of highly hydraulic limes. It is also demonstrated that a sufficiently high temperature results in entirely satisfactory products. It is not necessary to fuse nor sinter. It is enough to mix the pulverized substances which are to take part in the reaction, and to heat them to a certain temperature. As the formation of basic calcium sulfate takes place at about 600 deg. C. due to the dissociation of calcium carbonate, and as the point of fusion of basic calcium sulfate is much lower than that of ordinary anhydrite, decarbonation of limestone begins at temperatures of 600 to 850 deg. C. The decomposition of limestone at this temperature in the presence of gypsum is practically a quantitative reaction. Of great influence on this decomposition is the fineness of the materials. It is generally recognized that decomposition of lumps of limestone in shaft kilns requires temperatures of 1100 to 1200 deg. C.

Effect of Varying Mixtures on Strength

The results obtained by varying the mixtures show a considerable increase in strength. A relatively high lime content has a beneficial effect on certain mixtures. The minimum strength values of these products are higher than those of highly hydraulic limes. To illustrate this point, a tabulation of the strength values of different limes is given below:

Ordinary lime. 1:3 sand mortar after 28-day air curing: tensile strength, 2 kg./cm.²; compressive strength 6 kg./cm.². After 56-day air curing: tensile, 3 kg./c.m.₂; compression, 8 kg./cm.².

Weakly hydraulic limes. 1:3 sand mortar after 21-day air and 7-day water curing: tension, 2 kg./cm.²; compression, 6 kg./cm.². After 21-day air and 35-day water curing: tension, 3 kg./cm.²; compression, 10 kg./cm. .

Strongly hydraulic limes. 1:3 sand mortar after 7-day air and 21-day water curing: tension, 5 kg./cm.²; compression, 12 kg./cm.² After 7-day air and 40-day water curing: tension 8 kg./cm.²; compression, 20 kg./cm.².

Trass + lime: 1 part by vol. trass + 1 part by vol. lime putty + 1 part by vol. sand after 3-day air and 28-day water curing: compression, 70 kg./cm.² (specified minimum strength).

Link lime: 1 part by wt. Link lime + 3 parts by wt. standard sand after 28-day curing (1 day in moist closet + 27 days in water): tension, 9 kg./cm.²; compression, 39 kg./cm.² After 28-day air curing with daily sprinkling from 14 to 21 days: tension, 14 kg./cm.²; compression, 53 kg./cm.².

Jurament (mainly from oil shale or clay shale): 1 part by wt. Jurament + 3 parts by wt. sand after 28 days (1 day moist closet + 6 days in water) according to Swiss standards: tension, 10 kg./cm.²; compression, 132 kg./cm.².

Roman cement: 1:3 sand mortar after 28-day water hardening, according to Swiss standards: tension, 10 kg./cm.²; compression, 90 kg./cm.².

Due to the loss on ignition and the consequent loss of weight of the test specimens, the author was not always able to maintain the 1:3 mortar ratio in the cubes, the sand admixture being in such cases higher than indicated. Further tests, now being carried out, will throw more light on this subject.

It is notable that all specimens, for resistance to moisture and temperature effect in accordance with Budnikoff's method, yielded the desired results. This phenomenon was the more surprising, as unsoundness could be expected in some of the cases, particularly where the lime content was high.

In preparing the compression specimens, the sand was thoroughly mixed with the mortar under addition of water and the mixture was then introduced into the molds, in which it was tamped by hand. This procedure, contrary to standard practice, which requires 150 2k. blows from a height of 167 mm. and could have resulted only in still better compacting of the constituents with consequent higher strength values than those obtained.

It was also established that $CaCO_3$ could be replaced by other carbonates or oxides of the earth alkali group. The mixing proportions of limestone and gypsum in the molecular composition 2CaO may be selected up to $5CaO \cdot 1CaSO_4$. These and similar products showed good hydraulic properties.

A process by Dr. Max Clasz (*D.R.P.* 426, 760 Kl.80b of April 3, 1925) should be mentioned here, which produces artificial massive stone blocks from gypsum by first treating dolomite with sulfur dioxide (SO_2) and then grinding it with calcined gypsum.

Considering that in Budnikoff's method gypsum is first dead-burned at 500 deg. C. and then has its hydraulic properties restored by a catalyzer, an advantage is seen in that burning to slightly higher temperatures (600 to 850 deg. C.) benefits mainly the decomposition of the limestone rather than the gypsum.

In conclusion, the gypsum phases, their structures and their hardening, when mixed with basic oxides and anhydrides, will be briefly summarized.

(*To be concluded*)

Canadian Asbestos Producers Called into U. S. Court

AN unusual and serious situation seems to have been developed recently in the Canadian asbestos industry, according to information just received from Montreal by ROCK PRODUCTS. The crux of the situation is the question of whether the United States courts can govern agreements between Canadian companies and American companies operating in Canada, in regard to questions of stabilizing prices. As can be readily seen, this controversy may have far-reaching effects, even beyond the asbestos industry, where it is certain to have significant results.

To understand the situation it is necessary to outline the position of the asbestos industry. Canada produces nearly all the raw asbestos used in North America. In particular, the Canadian mines supply a large percentage of the asbestos used in the United States. Besides supplying her own domestic needs for raw asbestos, she sends 200,000 tons annually to the United States. But these shipments come chiefly from American-owned mines in Canada. These companies for the most part send their raw asbestos to their own mills to be manufactured, but not all is so used, since the surplus is sold to other manufacturers in the United States.

It will be easily understood that this condition tends towards great competition in the raw asbestos market. The American companies, taking raw asbestos out of Canada for manufacture in their own mills, do not need to care particularly what the market price of raw asbestos is. They can afford, if they choose, to lower the prices of whatever surplus of raw asbestos they have for sale outside of their own manufacturing requirements. This condition disrupted for years the asbestos industry in Canada, for the mines owned by Canadian companies have no manufacturing affiliations. There is not sufficient domestic market in Canada for that, and so the Canadian-owned mines had to suffer from an unfair competition in the market price of raw asbestos. The Canadian companies were at another disadvantage since the Canadian manufactured asbestos products were shut out of the United States by a high tariff, although the raw product was admitted free of duty.

Consolidation of Canadian Mines

To remedy some of these troubles, the Canadian companies began a move toward achieving a more fair condition some years ago. The first step was the consolidation of Canadian-owned mines, which resulted in most of the Canadian-owned mines amalgamating under the title of the Asbestos Corp., Ltd. After this was attained, the total production of raw asbestos yearly in Canada—in all America, indeed, except about 5000 tons—stood as follows, according to the brief of the United States attorney-general:

Asbestos Corp., Ltd. (Canadian), 110,000 tons.

A. S. Johnson Mines (Canadian), 5000 tons.

Keasbey and Mattison (American), 45,000 tons.

Johns-Manville (American), 70,000 tons.

Quebec Asbestos Corp. (American), 25,000 tons.

Two years ago a further move was attempted in the direction of regulating prices. Contracts were negotiated on behalf of the Asbestos Corp., Ltd., with the three American companies for the purchase at a fixed price of any surplus of their mills in the United States. These contracts were each made for a period of five years, expiring in 1930. Under this new condition it was possible to stabilize the prices of the various grades of raw asbestos, and for the first time the Canadian asbestos industry seemed likely to enjoy fair conditions. That the Canadian industry needed this is suggested by the fact that the Asbestos Corp., Ltd., has never paid a dividend on its common stock.

However, this regulation of prices in Canada meant a higher price to users of asbestos in the United States, and a protest was made to the United States government that the contracts between the Asbestos Corp. Ltd., and the American companies owning Canadian mines were in contravention of the Sherman anti-trust act. As a result, the United States attorney-general has given notice of an action to compel annulment of the contracts and to forbid the asbestos companies—including both the Canadian-owned mines and the American companies—from now or ever doing anything to restrict the prices of raw asbestos. All the companies—including the Canadian—have been notified to appear in court to answer the action.

The complications which may arise are various. The companies may refuse to appear in court, or at least, the Canadian company may decline to appear. In the latter case, it is a question what action will follow. The Canadian company holds the contracts, and the other mines which the contracts concern, although owned by Americans, are in Canada, and the contracts were made and no doubt could be enforced in Canada, no matter what the United States government says. On the other hand, if the Canadian company should appear in court and receive an adverse decision, there would be a precedent set which would encourage the attack on other Canadian industries—such as the pulp and paper industries, which have now reached immense proportions. It is certain, at the least, that a direct result of such an adverse decision would be to place the Canadian asbestos industry in its old position with all of its former troubles.

Two Bulletins Issued by Illinois Geological Survey

THE State Geological Survey of Illinois has recently issued two bulletins of some interest to rock products producers. One of these, just off the press, is "Structure and Oil Prospects in Eastern Clark County," by Gail F. Moulton and Jackson S. Young. The paper is a study of petroleum in the eastern portion of the state, and of the Devonian limestone in which the oil is reported to be found. The bulletin is available at the State Geological Survey, at Urbana, for 25 cents. The other bulletin, previously issued, is entitled "Pleistocene Studies," and is made up of a paper on "The Farm Creek Exposure Near Peoria, Ill.," by M. M. Leighton, chief of the State Survey, and another paper on "Pre-Illinoisan Till in Southern Illinois," by Paul MacClintock. The former paper deals with the structure of the land as shown at a well-known exposure east of Peoria, explaining the makeup of the various strata and their origin. The other paper relates to soil structure in southwestern Illinois. Both papers should be of interest to producers who attempt to understand the formations from which their products come, as the discussion is well written, clear and concise.

North African Phosphate

THE two leading phosphate producers in Tunisia and the principal factor in Algeria have reported a larger volume of deliveries in 1927 than in 1926, as follows, in metric tons:

Gafsa Co. (Tunis)—1926, 1,880,553; 1927, 2,039,570.

Tunisian Phosphate Co.—1926, 374,600; 1927, 412,300.

Constantine Mines (Algeria)—1926, 601,-674; 1927, 793,118.—*The American Fertilizer.*

Lime Burning Practice Based on European and American Observations

Part IV.—The Rudersdorf Lime Plant Near Berlin, Germany—One of the Most Interesting Plants Abroad

By Victor J. Azbe
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ONE OF THE MOST INTERESTING German plants is located near Berlin, at Rudersdorf. This plant was built by the Kurt von Gruber Co., of Berlin, manufacturers of various types of machinery for the Statliche Berg Inspecktion. The kilns are newly built and employ the old mixed-feed principle of alternate layers of stone and coke. While such operation should ordinarily have little interest to the one employing gas kilns, in this case much valuable information can be extracted having, by comparison, a great deal of value.

Fig. 7 shows the plant and Fig. 8 a cross-section of the kiln. The kilns are automatically drawn, the lime is sheared out uniformly through the cross-section by means of a revolving grate, upon which the entire kiln charge rests. This grate has projecting corrugations and openings through which the lime drops. It then passes into a revolving cylinder through a gate that opens and closes periodically. There is a second gate on the outlet side of the cylinder opening and closing alternately with the first. By this means one or the other gates is always closed and so a high blast pressure can be maintained at the kiln base.

Measured Air Supply

The blower shown supplies the air to the kiln, which first passes through a Venturi throat or meter, and so can definitely be measured. The blast pressure at the kiln base is considerable, varying between 2½ to 12 in., depending upon the condition of the charge in the kiln and the output rate at which the kiln is being operated. This high pressure may, to many, appear quite puzzling, but it is entirely explained by the three governing factors as follows:

(1) The limestone charge into the kiln is very un-uniform in size, from dust to as high as 10 in. Fig. 9 shows plainly the un-uniformity. To pass air through un-uniformly sized small and large stone is even more difficult than to pass it through an all small and uniformly sized charge.

(2) Fig. 10 shows that the fuel used is the smallest size coke, called breeze. Such fuel further obstructs the air passage and creates considerable resistance to gas flow.

(3) Friction varies as the square of velocity, and so doubling the velocity will quadruple the pressure drop. Since these kilns have an output of some 2500 lb. of lime per square foot of shaft area, which is over twice that of any kiln known to the writer in the United States, the gas flow naturally must be quite high and friction great.

The amount of gas that has to pass through the kiln depends upon the kind of stone that is being burned and upon the kiln efficiency. In this case, the lime made is of the hydraulic variety containing some 20% of silica, alumina and iron oxide. Since in lime burning the greatest heat absorption process is that of driving off the carbon dioxide (CO_2) from the lime, it is reasonable to conclude that limestone containing considerable amounts of the oxides of the above elements will be burned with smaller heat demand. This statement is, however, only true when the lime is burned below sintering temperature, when actual fusing is aimed at, as in sintering magnesite or dolomite, or burning cement, the temperatures required are considerably higher than for burning lime, and the fuel requirements are somewhat greater.

Efficiency of Mixed-Feed Kiln

Then again the mixed-feed kilns are considerably more efficient than any of the others, mainly due to equal distribution of heat through the kiln cross-section, so that the ratio of 5 to 1 obtained in this plant with fuel of only 9000 to 10,000 B.t.u., while very high, is not an unreasonable one. The efficiency is about 65 to 70%.

The average carbon dioxide (CO_2) content of the gases varies between 30 to 39%.

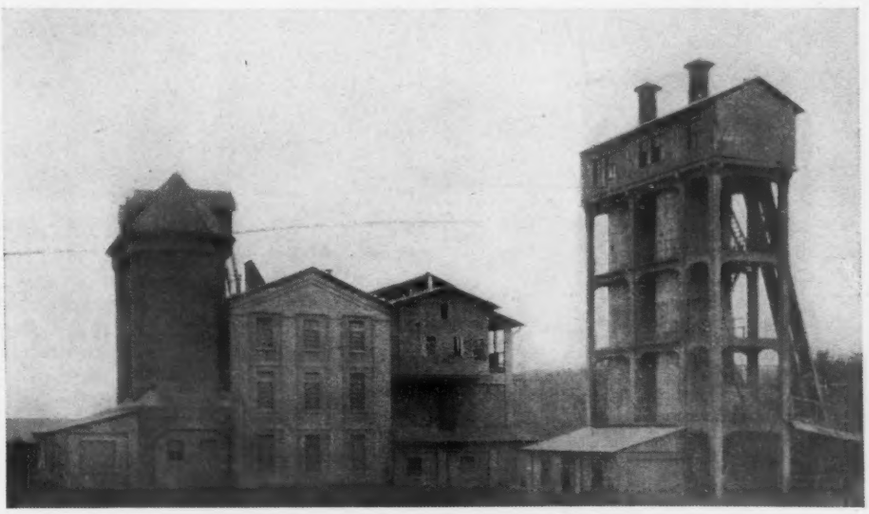


Fig. 7. General view of Rudersdorf lime plant near Berlin

Carbon monoxide is ordinarily present only in traces; only occasionally after charging the kiln may it rise to 1 to 15%, so evidently the amount of air used is close to that theoretically required, and burning is fairly uniform, even though uniform coke distribution, due to its fineness, is a difficult matter.

That capacities so high with such un-uniform stone and such small coke is possible is of the greatest interest to any lime manufacturer, regardless of type of kiln used. It proves that a kiln will have a high output if the heat is brought into the kiln. That will be true with mixed-feed kilns, gas or direct-fired kilns. Why this kiln had the high output is mainly because the proportioning of the air blast, a high air pressure, more than equal to the high resistance, resulted in a high combustion rate. Kiln output is almost always proportionate to heat imput, and the kiln should not be blamed

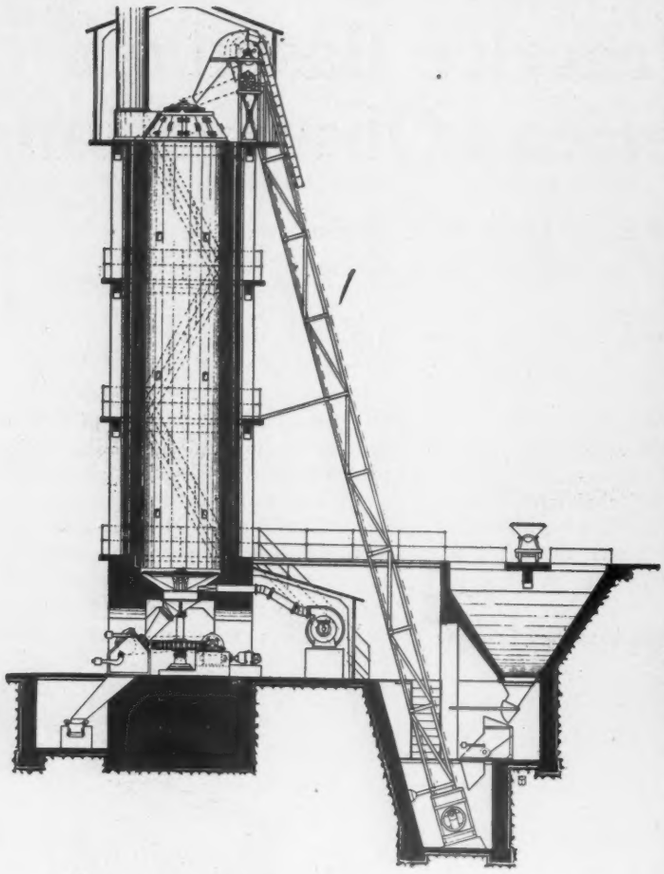


Fig. 8. Cross section of kiln at Rudersdorf plant

Fig. 9. Limestone for the kiln, showing the uniformity of the charge

for low capacity, when not enough heat is supplied for it to have high capacity.

These kilns are also of interest to those lime manufacturers who now throw great quantities of small stone away, since they cannot be burned in gas or direct-fired vertical kilns, nor profitably in rotary kilns.

Mixed-feed lime, however, will necessarily be contaminated and discolored with ash; whether this contamination will seriously harm the lime depends upon the ash found in the coke or other fuel low in volatile matter that is used. This subject was discussed previously.

Rock and Coke Handling Methods

The rock and coke handling system is of some interest. Fig. 11 shows the top of the bins and how the stone is brought and unloaded. Of particular interest is the measuring hopper *b* in Fig. 12. All coke and stone from the bin first has to pass through this hopper, where it is measured off volumetrically. By this means the various charges of rock and coke can be definitely proportioned and a rather close check on output and fuel efficiency can be maintained.

Fig. 11. The top of the kilns, showing how the stone is brought and unloaded

While the filling of the measuring hopper *b* is manually controlled, the conveyor *c* gets the stone or coke from *b* automatically and continuously. This material is delivered to the bucket elevator and elevated to the kiln top, where it is distributed between the two kilns with a belt conveyor. A revolving spout and the additional assistance of a man assure that stone and coke are distributed in the kiln in layers

Fig. 10. Looking into the top of the kilns. Note the small size of the coke used

Fig. 12. Horst Laeger, engineer for the Curt Von Gruber Co. (left), and the kiln operating superintendent

of proper and uniform thickness.

For a two-kiln operation only three men per shift of eight hours are necessary. These oversee the drawing and charging of the kilns; considering that the total output is 160 tons per day, labor costs certainly are low and should fully justify the comparatively high investment. It is quite possible, however, that if the high capacity is taken into consideration, the investment per ton of output is low also.

Lime Handling

The lump lime from the kiln is conveyed to a crusher *k*, then elevated and distributed between slaking bins *m*. Previous to this, it is mixed with a certain amount of water. It then remains in these bins for an extended period. The water combines with the free lime which expands and disintegrates, the non-slaking particles consisting of silica and alumina in combination with part of the calcium oxide. Since, however, this slaking does not disintegrate the entire mass, the material after being slaked is ground, then stored and sacked. This procedure is one of the ordinary variations when lime of the hydraulic type is made. In some cases the slaked lime first passes through an air separator and only the coarse remaining material is ground. This is usually the procedure with mildly hydraulic lime.

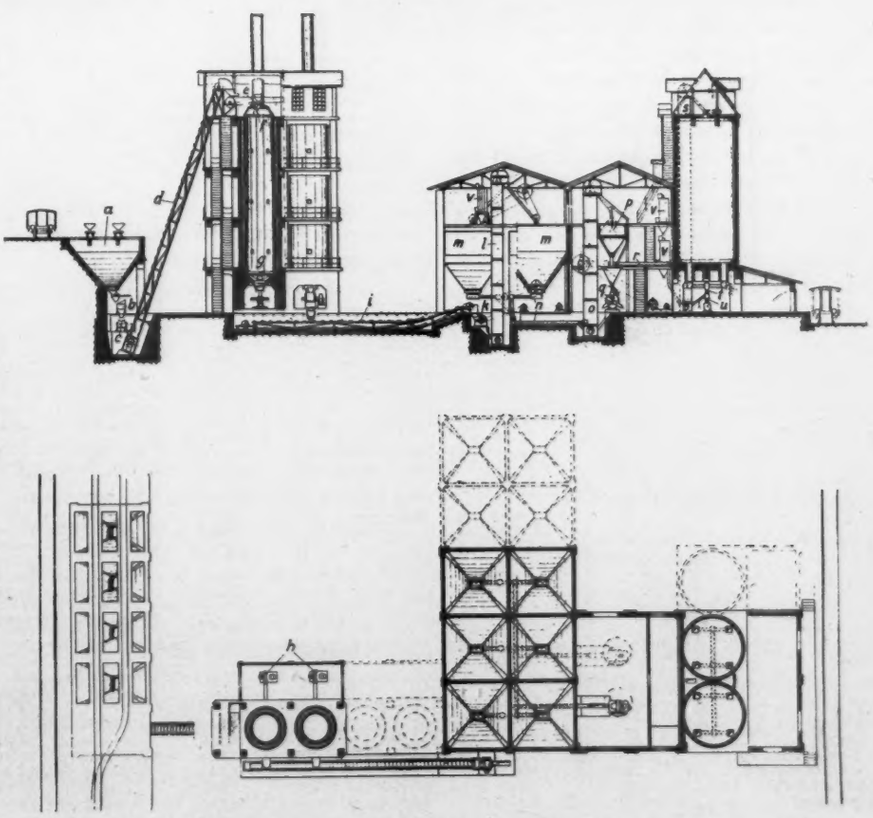


Fig. 13. Elevation and plan showing rock and coke handling system

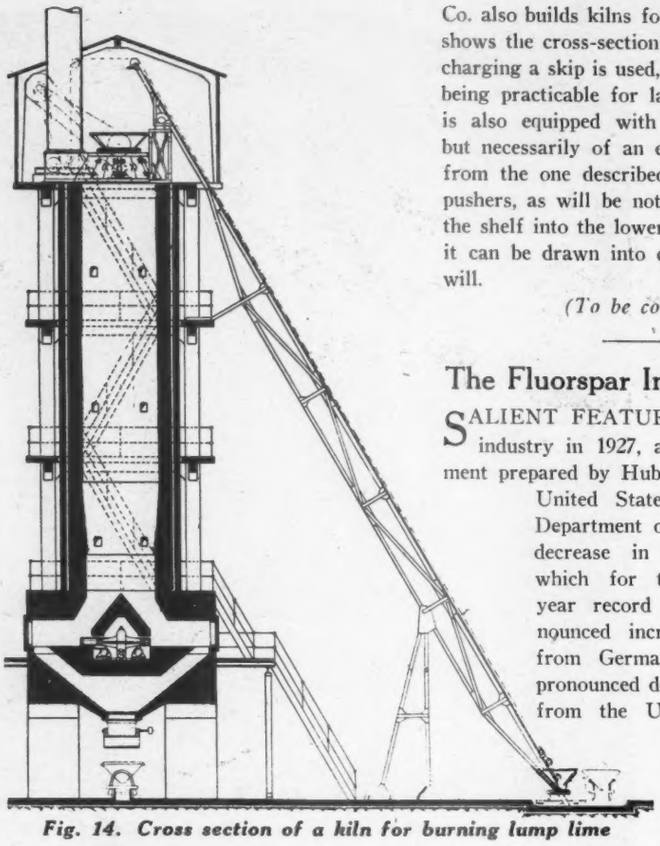


Fig. 14. Cross section of a kiln for burning lump lime

In Fig. 12 are Horst Laeger, engineer for the Curt von Grueber Co., and the kiln operating superintendent. In the background is the bucket elevator for elevating of stone and coke.

Of considerable interest is the quarry. The face is rather high, but instead of working it on a slope or in benches a mining system of tunnels is employed, leaving pillars which later on are shot away.

The Rudersdorfer lime is in small sizes when it leaves the kiln, first due to the small size of stone with which the kiln is charged; and second, because the revolving grate disintegrates the larger piece to a size of a few inches in diameter. The Curt von Grueber Co. also builds kilns for lump lime. Fig. 14 shows the cross-section of such a kiln. For charging a skip is used, a bucket elevator not being practicable for large stone. The kiln is also equipped with an automatic draw, but necessarily of an entirely different type from the one described. The reciprocating pushers, as will be noted, push the lime off the shelf into the lower portion, from which it can be drawn into carts or conveyors at will.

(To be continued.)

The Fluorspar Industry in 1927

SALIENT FEATURES of the fluorspar industry in 1927, as shown by a statement prepared by Hubert W. Davis, of the United States Bureau of Mines, Department of Commerce, are the decrease in domestic shipments, which for the fifth consecutive year record a decline; the pronounced increase in the imports from Germany, and the equally pronounced decrease in the imports from the United Kingdom; the large stock of fluorspar at consumers' plants on December 31, 1927, especially the stocks of 85,000 tons that have been accumulated at basic open-hearth steel plants; and the increase in producers' stock-piles, which are also the largest ever accumulated.

The figures on production of fluorspar in Illinois were collected in co-operation with the State Geological Survey.

The fluorspar shipped from mines in the United States in 1927 amounted to 112,546 short tons and was valued at $2,034,728, as compared wth 128,657 tons, valued at $2,341,277, in 1926. Thus there were decreases of 13% both in quantity and in total value as compared with 1926. Fluorspar was shipped from Colorado, Illinois, Kentucky and New Mexico in 1927, but New Mexico was the only state to record an increase.

The reported shipments of fluorspar to manufacturers of enamel and of hydrofluoric acid were more than in 1926, but the shipments to manufacturers of iron and steel and glass were considerably less and the quantity exported was the largest since 1921.

The general average value per ton f.o.b. shipping points for all grades of fluorspar in 1927 was $18.08, which is 12 cents less than the average for 1926. The general average value of the fluorspar shipped to steel plants in 1927 from the Illinois-Kentucky district was $16.59 a ton and from the Colorado-New Mexico district $13.72 a ton. These values compare with $16.98 for the Illinois-Kentucky district and $12.69 for the Colorado-New Mexico district in 1926. This difference in average values represents rather the differences in freight costs from the mines to consuming centers than differences in quality of fluorspar from these two districts.

The following tables show the details of the shipments of fluorspar by states, by kinds, and by uses for 1926 and 1927:

FLUORSPAR CONSUMED AND IN STOCK IN THE UNITED STATES, 1926-1927, BY INDUSTRIES, IN SHORT TONS

	1926		1927	
Industry	Consumption	Stocks at consumers' plants Dec. 31	Consumption	Stocks at consumers' plants Dec. 31
Basic open-hearth steel	142,000	70,000	138,000	85,000
Electric-furnace steel	4,800	2,000	4,700	1,200
Foundry	4,335	1,400	3,400	1,000
Ferro-alloys	462	180	500	100
Hydro-fluoric acid and derivatives	7,591	12,153	15,500	13,000
Enamel and vitrolite	6,677	935	5,800	800
Glass	7,973	1,342	6,800	900
Miscellaneous	719	252	1,500	400
	174,557	88,262	176,200	102,400

FLUORSPAR SHIPPED FROM MINES IN THE UNITED STATES, 1927-1927, BY STATES

	1926			1927		
	Short	Value		Short	Value	
State	tons	Total	Average	tons	Total	Average
Illinois	53,734	$1,012,879	$18.85	46,006	$ 863,909	$18.78
Kentucky	62,494	1,167,129	18.68	57,495	1,040,338	18.09
Colorado	10,440 }	161,269	12.98	{ 6,432 }	130,481	14.43
New Mexico	1,989 }			{ 2,613 }		
	128,657	$2,341,277	$18.20	112,546	$2,034,728	$18.08

FLUORSPAR SHIPPED FROM MINES IN THE UNITED STATES, 1926-1927, BY KINDS

	1926			1927		
	Short	Value		Short	Value	
Kind	tons	Total	Average	tons	Total	Average
Gravel	112,092	$1,868,854	$16.67	97,036	$1,599,310	$16.48
Lump	5,292	108,710	20.54	4,960	105,062	21.18
Ground	11,273	363,713	32.26	10,550	330,356	31.31
	128,657	$2,341,277	$18.20	112,546	$2,034,728	$18.08

FLUORSPAR SHIPPED FROM MINES IN THE UNITED STATES, 1926-1927, BY USES

	1926			1927		
	Short	Value		Short	Value	
Use	tons	Total	Average	tons	Total	Average
Steel	105,614	$1,744,085	$16.51	93,196	$1,523,915	$16.35
Foundry	6,212	121,453	19.55	4,533	84,724	18.69
Glass	7,507	240,288	32.01	5,968	184,450	30.91
Enamel and vitrolite	3,410	113,445	33.27	3,813	119,888	31.44
Hydrofluoric acid	3,410	79,105	23.20	3,748	98,364	26.24
Miscellaneous	372	7,986	21.47	903	15,880	17.59
Exported	2,132	34,915	16.38	385	7,507	19.50
	128,657	$2,341,277	$18.20	112,546	$2,034,728	$18.08

Imports

The total imports of fluorspar into the United States in 1927, amounting to 71,515 short tons, represent a decrease of 5% from the record year 1926, but are the second largest ever recorded. The imports in 1927 are equivalent to 64% of the total shipments of domestic fluorspar, as compared with 59% in 1926.

The figures on consumption of fluorspar in 1926 and 1927 and stocks at consumers' plants at the close of each of these years, given in the following table, while not including data from all consumers, are believed to fall not far short of the total for the United States. Thus, the figures for the basic open-hearth steel industry, the chief consumer of fluorspar, include actual figures for the 72 companies that make 99% of the total basic open-hearth steel and estimates for the other 3 companies.

Discussion of Bureau of Public Road's Report on Comparative Test of Crushed-Stone and Gravel Concrete

Abstract of an Article in the March Issue of "Crushed Stone Bulletin"

By A. T. Goldbeck
Director, Bureau of Engineering, National Crushed Stone Association, Washington, D. C.

THE TESTS described on the preceding pages of the *Bulletin* are of very great significance, primarily because they show the influence which the coarse aggregate may have on the kind of strength which is so desirable for concrete road construction, namely, transverse strength. It is a fact that high compressive strength may be obtained even with the use of comparatively inferior coarse aggregates, but apparently the transverse strength of concrete is influenced by the characteristics of the coarse

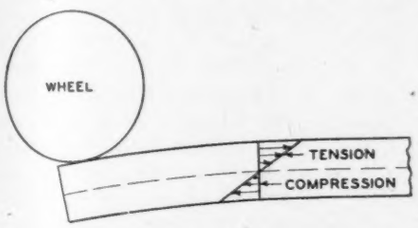


Figure 1-A, showing stresses with wheel at corner of road slab

aggregates. For those who are not informed on the importance of high resistance to cross-bending or to direct tension in concrete for highway construction, it will not be amiss to enter into a brief discussion of this matter.

When the road is opened to traffic the heavy wheel loads cause bending of the slab. If the wheel is placed at a corner formed by a transverse joint and the side of the slab, that corner is bent down and as a result of the bending tension is produced in the top of the slab and compression at the bottom. These tensile and compressive strengths are practically of identical amounts as shown by actual measurement. This stress condition is shown in Fig. 1-A.

When the wheel load is placed at the edge of the slab at some distance from the corner the slab is bent as shown in Fig. 1-B. In this case horizontal compressive stress is created at the top of the slab and horizontal tension at the bottom. Again the tension is equal to the compression, and this is a very important fact in the demonstration of the great significance of the transverse test for concrete for use in highways.

The integrity of concrete is thus seen to be largely dependent on the resistance offered by the concrete to bending, but there is one peculiarity about concrete road design which is not fully realized by many engineers, namely, that under heavy, frequent traffic the bending stresses very nearly approach the resistance of the concrete to repeated bending. In other words, concrete roads have a very small factor of safety against repeated bending stresses, and even a slight lack of bending resistance may result in rapid cracking and a slight excess may greatly delay or even prevent excessive cracking. The very fact that it is economical to design concrete roads up to the very limit of safety as far as cross-bending resistance is concerned, shows very forcibly the importance of using a concrete having as high a cross-bending resistance as possible. Such concrete will also have a sufficiently high compressive resistance, but the converse is not always true. Many states have already recognized the bending test for concrete as being of very much greater significance than the compressive tests, and others are following.

Application to Design

It has been generally accepted, as the result of extensive field and laboratory investigations, that a concrete road should be designed by the use of the following formula:

$$D = \sqrt{\frac{3W}{S}}$$

Where
D = Thickness of the slab at the edge
W = Maximum wheel load to be applied
S = One-half the modulus of rupture

The value for S is taken at ½ the modulus of rupture because laboratory tests have shown that if the working stress exceeds approximately 55% of the modulus of rupture, the concrete will fail in a comparatively few applications of load due to fatigue, while if the stress is kept below that figure the load may be applied millions of times and fatigue is long delayed.

Let it be assumed that the modulus of rupture of the concrete is equal to the average value of the stone concrete at 28 days, namely, 570 lb. per square inch. The working stress would then be 285 lb. per square inch for use in the above formula. The modulus of rupture of the gravel concrete was only 505 lb. per square inch at 28 days and a stress of 285 lb. per square inch is 56.3% of this modulus of rupture, while the same stress of 285 lb. per square inch is only 50% of the modulus of rupture of the stone concrete. As 55% of the modulus of rupture seems to approximate the "dead line" beyond which the stress should not extend to prevent fatigue, it is well demonstrated how very important seemingly slight difference in modulus of rupture in concrete can be. The above assumed gravel concrete road having the same thickness as the stone concrete road is apt to be unsafe against cracking due to fatigue while the stone concrete road should remain uncracked. This is simply another way of stating that the fatigue limit of this particular gravel concrete will be reached sooner than the fatigue limit of the stone concrete because of its lower modulus of rupture.

It is entirely logical, therefore, that one of two things be done to improve the strength of the gravel concrete road: (1) Increase its thickness so that its bending stresses will be decreased to a value not in excess of 50% of its modulus of rupture. (2) Change the proportions of the gravel concrete, requiring more cement so as to increase its modulus of rupture. The Bureau of Public Roads-New Jersey tests do not show what change in proportions might be made in the

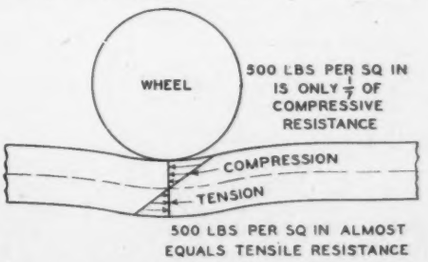


Fig. 1-13. Showing stresses with wheel at side of road slab

gravel concrete to make it of equal cross-bending strength as the stone concrete, although they do give an answer to the question of how much extra thickness of gravel concrete is necessary to make it of the same slab strength when crushed stone is used.

Bound Brook Tests

In order to get an answer to the second question, namely, of what proportions of

gravel concrete will give approximately the same cross-bending resistance as given proportions of stone concrete, the writer directed a short series of tests at the plant of one of the stone producers of New Jersey at Bound Brook. Identically the same coarse aggregates were used in these tests as in the Bureau of Public Roads-New Jersey State Highway Department tests, but, in addition, there were also included a sample of dolomite of very high grade and also a sample of gravel of very low resistance to wear in the "Gravel Abrasion Test," approximating 25% to 30% loss. Concrete was made from these respective coarse aggregates using the same fine aggregate in all cases. The proportions and the gradation of the coarse aggregates were varied and the concrete mixes were designed to produce concrete having predetermined amounts of cement per cubic yard. In some cases the proportions were made on the basis of dry, rodded volumes according to A. S. T. M. methods for determining weight per cubic foot, and in other cases the proportions were in terms of loose volume. Beams were made 6 in. in cross-section and 30 in. long and were broken as cantilevers at the end of 14 and 28 days. The aggregate gradations used were purposely made to cover the range of gradings permitted by the New Jersey State Highway Department specifications. Crushing strength tests were also made on the pieces resulting from the beam tests. In general, all of the aggregate show high compressive strength irrespective of quality or type. The differences in crushing strength are not significant and all crushing strengths were well above those ordinarily required for concrete roads. The cross-bending strengths were quite different in value, depending upon the coarse aggregates as shown in the accompanying table. The trap rock and dolomite are grouped together. The so-called concrete gravel having 6% wear is placed in the middle group and the ¾-in. gravel, having 25% to 30% wear, in the bottom group. It is quite striking that the modulus of rupture of the stone concrete is much higher than of the gravel concrete and very much higher than the ¾-in., or poor gravel, concrete.

Each result is the average of three cross-bending tests. Comparison of individual mixes is probably not warranted in these tests, but the average results are significant. It is to be noted that, although the stone concretes tested had an average cement content of only 6.1 bags per cubic yard as against 6.21 and 6.40 for the good gravel and poor gravel respectively, the modulus of rupture of the stone concrete was 53 lb., or 8.4% higher than the gravel concrete, and 130 lb. or 23.5% higher than the poor gravel concrete. In other words, the stone concrete had a higher modulus of rupture than the gravel concrete, even with a smaller content of cement per cubic yard.

The tests in their general results corroborate the Bureau of Public Roads-New Jersey State Highway Department tests, but they go further in showing that a change of proportion is warranted to produce road slabs of equal strength. They show that more cement is required in the gravel concrete instead of less cement as required by the time-honored arbitrary proportion method in which the proportions are stated as 1 : 1¾ : 3½, etc. The probabilities are, judging from the results obtained, that 10% more cement is necessary in the gravel concrete of high quality than in the crushed stone concrete, and perhaps as much as 30% more cement should be used in the concrete containing the poor gravel than that containing the crushed stone, in order that the strengths should be alike in all cases. The Bound Brook tests show that there is no basis for adhering to the same proportions of mortar when changing the proportions of concrete to suit different coarse aggregates, for it is shown that the stone concrete is stronger than the gravel concrete, even though its mortar is leaner. It may be well, in fact, to add to the sand content of the stone concrete and decrease it in the gravel concrete to make for workability in the former and prevent oversanding in the latter.

No doubt the differences in cross-breaking results in part are due to the shape of the fragments, to the roughness of their surfaces and to the strength of their fragments. It seems entirely reasonable that smoothness of surface must have influence on the cross-breaking resistance of concrete, because the adhesion of the mortar to the surface is probably aided when the surfaces of the coarse aggregates are rough, in much the same way as the bond resistance is increased mechanically in a deformed reinforcing bar as compared to a smooth reinforcing bar. It also seems reasonable that angularity of particle may be of some assistance in creating high tensile resistance because of the greater interlocking effect thereby produced. The strength of the fragments probably also has influence because the fragments are placed in tension.

Minnesota Tests

Some light is thrown on the question of influence of shape of particle and characteristics of surface by tests by F. C. Lang, engineer of tests and inspection, Minnesota Department of Highways. These tests (given in deail in the original paper) corroborate in a general way the tests previously cited and certainly show that shape of particle and smoothness of particle have influence on the cross-breaking resistance of concrete.

It should not be inferred from the above cited tests that all crushed stone will invariably test higher in cross-breaking strength than all gravel. The Minnesota crushed sandstone illustrates this point. It

Table Showing Results of Bound Brook Tests

STONE (Trap rock and dolomite)

Mix No.	Proportions	Bags	Grading	Method	28 Day Tests: Compressive strength lbs. per sq. in.	28 Day Tests: Modulus of rupture lbs. per sq. in.
27	1:1.70:3.67	6.0	5	A.S.T.M.	2866	560
11	1:1.78:3.67	6.0	4	"	3127	639
14	1:2:4	5.6	4	"	3883	650
12	1:1.74:3.67	6.0	4	"	3453	666
20	1:1.75:3.5	6.17	4	"	3343	678
4	1:1.79:3.5	6.3	2	"	3340	683
26	1:1.53:3.5	6.3	5	"	3516	684
6	1:1.65:3.5	6.3	4	"	3750	695
1	1:1.67:3.5	6.3	1	"	4141	708
28	1:1.76:3.5	6.3	6	"	3212	712
5	1:1.64:3.5	6.3	3	"	3786	712
15	1:2:4	5.56	4	"	4230	727
8	1:1.56:3.5	6.3	4	"	3433	770
	Average	6.1			Average 3544	Average 683

CONCRETE GRAVEL (6% wear, Gravel Abrasion Test)

2	1:1.36:3.5	6.3	1	A.S.T.M.	3995	592
7	1:1.23:3.5	6.3	4	"	3718	609
16	1:1.75:3.5	5.87	4	"	3373	621
25	1:1.23:3.5	6.3	5	"	3940	652
3	1:1.38:3.5	6.3	2	"	3940	672
	Average	6.21			Average 3793	Average 629

¾-INCH GRAVEL (25 to 30% wear, Gravel Abrasion Test)

10	1:1.15:3.5	6.3	7	A.S.T.M.	3201	495
19	1:1.5:3	6.48	7	"	3866	518
18	1:1.75:3.5	5.82	7	"	3767	593
13	1:0.85:3.15	7.0	7	"	4600	603
	Average	6.40			Average 3878	Average 552

COMPARISON OF AVERAGE VALUES FOR MODULUS OF RUPTURE AT 28 DAYS (A. S. T. M. METHODS)

Type of aggregate	Modulus of rupture	Cement Content, bags	Bags of Cement per 100 lbs. modulus of rupture	Ratio	Probable No. bags of cement required for equal modulus of rupture
Stone	683	6.10	0.892	1.00	6.0
Concrete Gravel	629	6.21	0.985	1.10	6.6
¾-Inch Gravel	552	6.40	1.16	1.30	7.8

COMPARISON OF AVERAGE VALUES FOR COMPRESSIVE STRENGTH AT 28 DAYS (A. S. T. M. METHODS)

Type of Aggregate	Compressive strength	Cement content, bags	Bags of cement per 1,000 lbs. compressive strength	Probable ratio of cement required for equal compressive strengths
Stone	3544	6.10	1.72	1.05
Concrete Gravel	3793	6.21	1.64	1.00
¾-Inch Gravel	3878	6.40	1.65	1.00

is very well demonstrated, however, that all coarse aggregates do not produce concrete having like road-making qualities, and it is thoroughly shown that it is not safe to proceed on that assumption in using aggregates in concrete roads.

Research in Slag and Slag Concrete

THE National Slag Association is publishing a series of pamphlets which it calls "symposiums," on the properties and characteristics of blast furnace slag. No. 1, "Absorption in Slag and Slag Concrete," and No. 2, "Resistance of Blast Furnace Slag to Abrasion and Wear," have just been received. They have been compiled by H. J. Love, secretary-treasurer of the association.

As the name indicates, these symposiums are gatherings of data from different investigations, arranged under proper headings. There is no attempt at making propaganda in the ordinary sense of the word. The quotations are tables of figures and statements, given without comment, from authoritative sources. Thus in the first symposium the first half of the 28-page pamphlet is mainly given to tables of tests on absorption of slag compared and uncompared with natural stones. An ordinary presentation of the case would seem to be that quoted from Bulletin No. 370 of the Bureau of Public Roads, which states that there are a number of natural rocks that have a higher absorption factor than slag among those which are used as aggregates. Prof. Abrams ("Proceedings," A. S. T. M., 1921, p. 1013) found slag had an intermediate place in a table of natural stones.

However, it is shown that slag is seldom fairly treated in an absorption test, as no account is made of the water remaining on the surfaces of the vesicular openings, which cannot be reached when the specimen is wiped dry, although this moisture is not really absorbed. When this is done, as was apparently done by E. C. E. Lord, Charles Reeve and Richard H. Lewis, whose results are quoted, the absorption factor of slag is found to be very low, as from its nature one would suppose it to be.

Regarding the absorption of concrete, a great many authorities both European and American are quoted. Tests on concrete pipe by the rather severe A. S. T. M. method (baking, cooling and boiling for five hours, are quoted rather fully. All these tests show that slag concrete compares well with concretes made of gravel and limestone in absorption tests, especially if the pounds of water absorbed per cubic foot of concrete rather than the percentage by weight is used as the basis of comparison.

Symposium No. 2, on resistance to abrasion and wear, is a 24-page pamphlet in which the subject is considered by reference to the Deval abrasion tests with its modifications, to the sand-blast test, to the Talbot-Jones and other rattler tests, and the Arlington circular track test.

The Deval abrasion tests, and modifications, showed a wide range in the resistance to abrasion of different specimens. One series picked at random includes a great many results which showed a loss by Deval wear ranging from 3.6% to 24.7%, the average being 13.7%. The Rea modification, in which iron balls are used, naturally shows even higher percentages of loss, one set of tests conducted by Fred Hubbard showing an average loss of 26.6%. Prof. Abrams' modification of the Deval test shows only 8.9% loss by abrasion.

The sand-blast apparatus when tried out on slags (a German method) showed wear about equal to the granite and porphyry and greater than the wear of some natural stones tested.

Regardless of the tests on slag itself, slag concrete shows up well in the wear tests conducted by Prof. Abrams, the Bureau of Public Roads and others. With the Talbot-Jones rattler, which is a more or less standard test for concrete wear, slag concrete was shown to be at least as wear-resistant as the other concretes tested, which included those made with gravel and several kinds of crushed stone as aggregates.

The tests on the Arlington circular track, with which most readers are probably familiar, brought out the same results as the rattler tests.

The Value of Gravel Property in Iowa

FARMERS in northwest Iowa whose land is underlaid by considerable deposits of gravel are receiving the prices reported as follows: Plymouth county has bought some gravel land, paying around $1,000 an acre for it, and just this spring 50 acres of gravel land near Cherokee sold for $600 an acre.

The deal in question is said to have brought out the highest price ever paid for a Cherokee county farm. The M. R. Gibbons Co., Chicago, paid E. E. Lyman $30,000 for 50 acres off a farm. The acreage is made up largely of gravel, which goes down to a depth of 60 ft. in some places.

It is estimated that there is enough gravel in this one deposit to gravel 4840 miles of primary roads. By the same token, there is enough gravel in this one deposit to gravel most of the secondary roads in Cherokee county and the counties surrounding.—*Le Mars* (Iowa) *Post-Globe.*

Safety Campaign for Ohio Quarries

OHIO QUARRIES have entered the month of April with the aim of making it a "No Accident Month." A general campaign is planned through the efforts of the Ohio Industrial Commission. A statewide campaign is being conducted by the commission during April to give stimulus to the drive to reduce industrial accidents in Ohio 25% during 1928.

Pennsylvania-Dixie Buys Pyramid Portland

THE PYRAMID PORTLAND CEMENT CO.'S plant, located just west of Des Moines, Iowa, was sold March 31 at a foreclosure sale to the Pennsylvania-Dixie Cement Corp., New York City.

The consideration was $1,050,000 cash. The new owner will take immediate possession of the property, having purchased the lease of the Pyramid Portland Cement Co. of Delaware, which is now operating the plant.

Officials of the Pennsylvania-Dixie Cement Co. announced that their corporation, which already has an output of 10,000,000 bbl. annually, is prepared to double or treble the size and output of the local plant, and that the rapidity with which the company will add improvements to the plant will depend entirely upon increase in the business.

Representing the Pennsylvania-Dixie Cement Co. at the sale today were: George Kilian, treasurer; George R. Shaw, assistant treasurer; Robert P. Mayer of the Cincinnati sales office, and Conrad C. Miller, superintendent of one of the corporation's plants in Georgia.

Mr. Kilian announced that Messrs. Shaw, Miller and Mayer will remain in Des Moines and will hold executive positions in connection with the Pyramid plant. Mr. Miller is the son of the chairman of the corporation's board.

There were but two bidders at the sale of the plant. A. O. Hauge, president of the Iowa Trust and Savings bank, trustee for the first mortgage bondholders, bid $1,045,000. This was followed by the bid of $1,050,000, offered by the Pennsylvania-Dixie Cement Corp.

The successful bid was slightly below the amount of the judgment of $1,056,000. However, it was said that the first mortgage bondholders will very likely receive in full the principal and accrued interests.

The physical property involved in the sale includes the plant and realty located west of Des Moines and 73 acres of land underlaid with rock used in the manufacture of cement.

The plant is operated electrically throughout. It has an annual output of 1,000,000 bbl. The Pyramid Portland Cement Co. of Delaware which held the lease, good until February 1, 1929, has been producing 3,000 bbl. of cement daily for several months. The lease, approved by the district court, called for a monthly rental of $7,000.

The plant has more than 150 employes on the pay roll, and under expansion plans tentatively outlined today by Mr. Kilian, this number will be increased in the near future.—*Des Moines* (Iowa) *Tribune-Capital.*

A trainload of agricultural limestone from the Dubuque Stone Products Co. for Iowa farmers

Distributing Agricultural Limestone by the Trainload

Dubuque Stone Products Co. Delivers Material to the Iowa Farmers on Railway Right-of-Way

THROUGH the co-operation of several railroads in Iowa with the county farm bureaus and the Dubuque Stone Products Co., Dubuque, Iowa, the farmers in the counties in northeastern Iowa are receiving agricultural limestone for spring treatment of the soil, at most convenient points adjacent to their farms, and in sufficient quantities to supply the fullest needs of the land. The Dubuque company conceived the idea of delivering the limestone directly to the farmers' "back doors"—that is, to points on the railroad right-of-way nearest to the land on which it was to be used—and in this to save the buyer an excessive haul of the material from the nearest station, which possibly might be several miles away. To do this, the railroads had to be persuaded to permit the stone to be dumped on their right-of-way and left until such time as each farmer could find the opportunity to remove the limestone to his own land. Obviously, too, it was necessary to obtain orders for considerable stone, since to ship two or three carloads out in this fashion would not warrant the expense and trouble of unloading at points other than regular stations. (This method of distributing agricultural limestone direct to the farm by rail was first developed in Illinois a year or so ago.)

Interest in Train

The first of the agstone was sent out from the Dubuque plant about the middle of March. It was determined that trains of 14 to 18 cars were the best units in which to distribute the stone, and accordingly orders for that amount had been obtained. In Blackhawk county near Jessup and Waterloo, J. L. Uban, county agricultural agent, was largely instrumental in "selling" the idea to the farmers, and upon the arrival of the train he virtually took charge of distributing the stone to the proper points along the track. Paul M. Nauman, general manager of the Dubuque Stone Products Co., was in charge of the affair for the stone company. H. G. Brown, trainmaster for the Illinois Central at Waterloo, and P. R. Farlow, agricultural agent for the Illinois Central, had made the arrangements for the railroad. In Blackhawk county two full trainloads were unloaded on the Illinois Central right-of-way in two consecutive days.

Dump cars with hopper bottoms were used the ship the limestone, to insure rapid unloading. Each farmer furnished two men to shovel and this crew made light work of getting the stone out of the cars and shoveling it clear of the track. Only 15 or 20 minutes was required to unload one car, but considerable time was used in letting the regular traffic of the road get past the points where unloading was in progress. About 16 or 17 cars are about all that can be handled in a day. Sometimes as many as five

Clearing the right-of-way after dumping a carload of limestone

Unloading agstone to shallow bins along the right-of-way

or six stops were made at prearranged points between stations, where the ground had been cleared to receive the stone.

The special limestone train was a curiosity and created much favorable comment among the farm people. They like to have the lime delivered in that fashion, since they don't have to hurry about hauling it and the expense of moving the lime was less than by the usual method. The price was $1.75 a ton to the farmer dumped at the point nearest to his land.

Besides this material saving to the farmer, the limestone trains are advantageous to the railroads and the stone company. The Dubuque company will undoubtedly find a marked increase in its business this year due to the extensive paving and construction program scheduled for territory near Dubuque this year, and these shipments of the agstone from the quarry will furnish an outlet for stone which could not be so advantageously used otherwise. The railroads increase their tonnage both in carrying the limestone and in the increased amounts of farm products to be transported in the fall.

Not only does that Dubuque company deliver the stone, but it stands ready to cooperate with farm bureaus in demonstrating the best methods of applying the stone to the soil. Also county agents are prepared to test samples of soil and the amount of limestone which must be used to remove this condition. According to figures by Mr. Nauman, who has made a study of limestone, the soil fertility can be increased by as much as 6⅔ bushels of corn to the acre.

The railroads which are co-operating in this distribution are the Illinois Central and the Chicago Great Western. A number of trains have been sent out over these lines already, and it is expected that shortly trains will be dispatched to points on the Chicago and North Western, and possibly a small trainload will be shipped to points on the Waterloo, Cedar Falls and Northern railroad, an electric line. Blackhawk county has received four or five trainloads already and Buchanan county has taken some. Two trainloads are scheduled to be sent to Delaware county in the latter part of April. From this it is easy to see that the idea has been received very favorably, due probably to the co-operation between the various people backing the project, and to the careful and intelligent manner it has been presented to farmers.

The Dubuque company has unquestionably performed a real service to the farmers of the surrounding territory, and at the same time has accomplished an excellent job of merchandising its products. The good will created by the distribution of the limestone so conveniently will be reflected in future sales no doubt, and the present disposal of thousands of tons of stone is in itself an excellent opportunity to clean the plant for a large production during the summer.

Some of the men responsible for the agstone train. Back—C. S. Todd, Dubuque company; H. G. Brown, I. C. R. R.; F. R. Kerrigan. Front—J. Sherman, farmer; W. A. Kennedy; Paul Nauman, Dubuque company; J. L. Uban, county agent; P. R. Farlow, I. C. R. R.

A stop made along the way—unloading the agricultural limestone at two points at the same time

United States Bureau of Mines to Study Quarrying Costs

Investigation Indorsed by National Crushed Stone Association and Committee on Conservation of Portland Cement Association

J. R. THOENEN, acting chief, structural materials section, Bureau of Mines, United States Department of Commerce, informs ROCK PRODUCTS that the crushed stone industry has asked the Bureau of Mines to undertake a detailed study of quarry costs. This study has been indorsed by the National Crushed Stone Association and the Committee on Conservation of the Portland Cement Association.

The objects sought by such a study of costs are to:

(1) Establish standard average costs for unit quarry operation.

(2) Compare costs of various unit steps by differing methods of operation.

(3) Guide efficiency of step in each operation by comparison of individual costs with standards.

(4) Illustrate advantage or disadvantage in a contemplated change of operation.

(5) Assist in establishing standardized cost-keeping systems.

The Bureau of Mines is interested in this compilation of costs only if by such collection and study it may be of assistance to the industry.

Official Announcement of Aims and Purposes

At the request of a representative group of the crushed stone industry the Bureau of Mines is preparing to undertake a detailed study of the operating costs of this industry.

In case of favorable responses from a majority of the members of the industry, the Bureau will undertake to make such a study and submits herewith for your consideration a questionnaire to be filled out and returned to the Bureau as a basis for a preliminary consolidated report of costs to be made to all reporting.

In view of a question raised by one of your number as to the confidential nature of individual reports, you are informed that this matter is safeguarded in the following manner. The Bureau is currently in receipt of confidential industrial information in response to questionnaires sent out accompanied by addressed return envelopes which require no postage and are so marked that they can be recognized in the mail room of the Bureau and sent unopened direct to the official handling such confidential information. They are there opened and filed by the official in charge or one of his personal staff, in locked steel filing cases, keys being in the hands only of those whose duty it is to compile the information.

An unvarying rule of the Bureau is that in publishing total or average figures in reports for general distribution, they must combine data from individual returns in a way which will leave no chance of exposure of the figures of any one contributor. You may rest assured that all figures submitted by you for this study will be handled as above outlined.

The plan suggested for a report of this cost study is that the data from the returned questionnaires shall be assembled into groups in which the various operating steps are comparable. Where such groups comprise three or more individual operations the figures will be averaged for the several steps and published as such.

QUESTIONNAIRE

General Information Calendar Year 1927

Name of Company:.....

Location of quarry or pit: State..... City.....

Stone: Limestone.....Dolomite.....Trap.....Granite, including syenite and quartzite.....Sandstone.....

Other stone.....

Type of Quarry: Quarry Floor { above..... level..... below..... } Crusher

Underground .....

Power: Oil..... Steam..... Electric..... Manufactured..... Purchased.....

Labor: Number in quarry.....Crushing and Screening Plant.....Other.....

Wage: Average daily.....all employees (including superintendents and plant office)

Production: Average per day of.....hours.....tons (2000 lb.)

Per cent of total production for cement.....Lime.....Lump or Rip Rap.....Crushed and Sized.....

Agricultural.....Pulverized.....

Capital Investment: Quarry and real estate $.....Crushing and Sizing plant $.....

Average number of days worked annually.....

Cost of exploration per acre.....if available

(Exclusive of all overhead charges)

Cost of quarrying one ton of stone $.....Cost of crushing and screening one ton of stone $.....

Cost of quarrying, crushing and screening one ton of stone $.....

Specific Information

OVERBURDEN

Character and depth: Loam.....ft. Clay.....ft. Hard pan.....ft. Shale.....ft. Limestone.....ft.
Dolomite.....ft. Sandstone.....ft.
Eroded.....Flat.....Inclined.....degrees

Part marketable: Average daily production.....tons (if distinct from quarry stone)

QUARRY STONE Per cent wear (U. S. Bureau of Standards test).....Massive and homogeneous.....
Bedded.....Jointed.....Inclined.....degrees. Thickness of beds.....
Thickness of partings.....Clay.....Shale.....

Thickness: Total thickness of stone.....

QUESTIONNAIRE (CONTINUED)

Method of Operation

(Form 2)

STRIPPING

Hand and wheelbarrow.....Scraper.....Power shovel.....Drag line.....Hydraulic.....
Blasting.....
Length of waste haul.....ft.
Method of transportation. Wagon.....Truck.....Tractor.....Standard gage Ry.....
Narrow gage.....
Flumes.....

Stripping Equipment:

No. and size of scrapers.....Type and capacity of drag line.....
No. and capacity of wagons.....
No. and capacity of trucks.....Water supply lake or river.....Impounded.....
No. and capacity of tractors.....Wells.....Height of lift.....ft.
Type, No. and capacity of locomotives.....Type, No. and capacity of pressure pumps.....
Type, No. and capacity of cars.....
Type and No. of drills.....Water pressure at and size of nozzle.....
Type, No. and capacity of power shovels.....Length and size of pipe lines.....
.....
Kind of explosives.....

Stripping Costs:

(Exclusive of all overhead charges)
Cost of removing overburden and placing on permanent dump
$.....per cu. yd. $.....per ton stone uncovered.
(Use that figure above which corresponds to your cost system)
Cost of drilling per cu. yd. $.....per ton $.....
Cost of blasting per cu. yd. $.....per ton $.....
Cost of loading per cu. yd. $.....per ton $.....
Cost of hauling and dumping per cu. yd. $.....per ton $.....

(Form 3)

QUARRY DRILLING

PRIMARY

Churn or well drills.....Rotary drills.....Piston drills.....Hammer drills.....
Hand.....
Height of quarry face.....ft. Average diameter and depth of drill holes.....
Holes.....ft. apart parallel to face. Holes.....ft. back of face.

Primary Equipment

Type, size and number of drills.....
.....
Power: Steam.....Compressed Air.....Electric.....
Size and shape of drill steel and bits.....

Primary Costs

(Exclusive of all overhead charges)
Drilling per ft. of drill stone $..... Drilling per ton of stone broken $.....

SECONDARY

Drilling.....Mudcapping.....
Type, size and number of drills.....
.....
Power..... Air pressure.....lbs.

Secondary Costs

(Exclusive of all overhead charges)
Per ton of stone produced $.....

BLASTING

Explosive: Nitro.....Starch.....Ammonia.....Gelatine.....Black powder.....Other.....
Strength: 20%..... 25%..... 30%.....40% ..... 50%..... 60%..... 80%.....
Sizes of cartridges.....
Detonators: Mercury.....Electric.....Cordeau.....
Strength: No. 5.....No. 6.....No. 7.....No. 8.....
Fuse type.....Rate of burning ft. per min.....

Performance

Pounds of explosive per ton of stone Primary.....
Pounds of explosive per ton of stone Secondary.....
By drilling.....By mudcapping.....

Costs

Cost of explosives per ton of stone Primary.....
Cost of loading per ton of stone Primary.....
Cost of explosives per ton of stone Secondary.....
Cost of loading per ton of stone Secondary.....

LOADING

Equipment

Hand.....Power Shovel.....
Power shovels No.....Wt.....Size.....
Dipper capacity.....Power.....Full Circle.....
R. R. Type.....Caterpillar.....Traction.....

Cost

(Exclusive of all overhead charges)
Cost of loading a ton of broken stone $.....

In this manner no single individual's costs will be made available to others but each will be able to compare his own costs with a group in which the various unit steps are similar.

A questionnaire has been arranged in great detail, but in such manner that the operator can fill in the majority of blanks by simple check marks.

Where it is impossible for an operator to answer all questions it is suggested that he fill in those he can answer and forward the questionnaire in that form.

The following explanation is advanced in order that there may be no misunderstanding of the questions and that all replies will be uniform.

(1) All cost figures required are desired

QUESTIONNAIRE (CONTINUED)

(Form 4)

TRANSPORTATION

Cart or wagon ..... trucks ..... Quarry car ..... Std. Ga. Car .....
Mules ..... Gas Loco. ..... Trolley Loco. ..... Steam Loco. .....
Storage Bat. Loco. ..... Hoist and Cable .....
Gravity plane ..... Tramway ..... Central electric control .....

Equipment

Type, size, weight and number of locomotives .....

Type, size and number of cars .....

Gauge and size of track .....
Power .....
Type and size of cable hoist .....

Type and size of gravity plane engine .....

Type and capacity of tramway .....

Costs

(Exclusive of all overhead charges)
Cost of transporting stone to crusher per ton $.....

CRUSHING

PRIMARY

Power .....
Crusher: Jaw ..... Gyratory ..... Rolls .....
Grizzly or scalper ahead of primary crusher. Yes ..... No .....
% Quarry product through scalper ..... %
% Quarry product to crusher ..... %
Size of feed ..... x ..... maximum
..... x ..... minimum
..... x ..... average
Size of crusher discharge opening ..... x .....

Equipment

Type, size and number of crushers .....

Costs

(Exclusive of all overhead charges)
Cost of crushing per ton crushed $.....

SECONDARY

Crushers: Jaw ..... Gyratory ..... Roll ..... Disc .....
Size of feed ..... x ..... Size of crusher setting .....

Equipment

Type, size and number of crushers .....

Costs

(Exclusive of all overhead charges)
Cost of secondary crushing per ton crushed $.....

(Form 5)

GRINDING

Type, size and number of grinders .....

Costs

(Exclusive of all overhead charges)
Cost of grinding per ton ground $.....

SCREENING

Scalpers Grizzly ..... Trommel .....
Sizing Screens Trommel ..... Shaking ..... Vibrating .....
Fine Screens Vibrating ..... Cyclone .....

EQUIPMENT

Trommels Type, size, no. .....
Grizzlies Type, size, no. .....
Shaking Screens Type, size, no. .....
Vibrating Screens Type, size, no. .....
Cyclones Type, size, no. .....
Sizes of Product Through (?) mesh and retained on (?) mesh .....

Costs

(Exclusive of all overhead charges)
Cost of separating per ton screened $.....

WASHING

Scrubbers ..... Log washers ..... Launders .....

Equipment

Type, size, capacity, number of units .....
Tons washed daily .....
Quantity of water used per ton washed .....

Costs

(Exclusive of all overhead charges)
Cost of washing per ton $.....

DRYING

Rotary kilns ..... Heated bins .....
Direct heat ..... Indirect heat .....
Steam ..... Hot air .....

EQUIPMENT

Kilns Type, size, capacity, number .....
Bins Type, size, capacity, number .....
Boilers Type, size, capacity, number .....

COSTS

(Exclusive of all overhead charges)
Cost per ton of stone dried $.....

EXCLUSIVE OF ALL OVERHEAD CHARGES except on Form 7.

(2) Form 1. Deals mostly with general information designed to facilitate classification of replies into groups. "Average wage" means total annual pay roll divided by shifts worked.

(3) Form 2. Deals entirely with quarry stripping operations.

QUESTIONNAIRE (CONTINUED)

(Form 6)

ELEVATING
Elevators — Type, size, capacity, number.....

Costs — (Exclusive of all overhead charges)
Cost of elevating per ton $.....

CONVEYING
Conveyors — Type, size, capacity, number.....

Costs — (Exclusive of all overhead charges)
Cost of conveying per ton $.....

STORAGE — (Exclusive of all overhead charges)
Cost of stock piling per ton $.....
Cost of reclaiming per ton $.....

Equipment — Conveyors..... Crane..... Shovel..... Port. Loader.....

PUMPING
Equipment — Type, size, capacity, no. pumps.....

Gals. pumped per minute.....

Costs — (Exclusive of all overhead charges)
Cost of pumping per ton stone produced $.....

ADDITIONAL OPERATING COSTS (*Not otherwise listed previously and not overhead charges*) — (Exclusive of all overhead charges)
Cost per ton produced $.....

(Form 7)

OVERHEAD COSTS
Depletion
Depreciation
Stripping equipment

Quarry charge per ton produced $..... Royalty charge per ton produced $.....

Hand tools life.....yrs. Scrapers life.....yrs. Power Shovel life.....yrs.
Drag line life.....yrs. Hydraulic life.....yrs. Locomotives life.....yrs.
Cars life.....yrs. Trackage life.....yrs.
Depreciation charge for Stripping Equipment per ton stone produced $.....
Quarry Drilling Equipment life.....yrs. Charge per ton stone $.....
Quarry Loading Equipment life.....yrs. Charge per ton stone $.....
Quarry Transport. Equipment
Locomotives life.....yrs. Cars life.....yrs. Trucks life.....yrs.
Tractors life.....yrs. Trackage life.....yrs. Hoist life.....yrs.
Tramway life.....yrs. Central Elect. Control life.....yrs.
Depreciation charge for quarry transport. equipment per ton stone produced $.....
Crushing: Primary equipment life.....yrs. Depreciation charge per ton $.....
Secondary equipment life.....yrs. Depreciation charge per ton $.....
Grinding equipment life.....yrs. Depreciation charge per ton $.....
Screening equipment life.....yrs. Depreciation charge per ton $.....
Washing equipment life.....yrs. Depreciation charge per ton $.....
Drying equipment life.....yrs. Depreciation charge per ton $.....
Elevating Equipment life.....yrs. Depreciation charge per ton $.....
Conveying equipment life.....yrs. Depreciation charge per ton $.....
Storage: Open, equipment life.....yrs. Depreciation charge per ton $.....
Bins, equipment life.....yrs. Depreciation charge per ton $.....
Buildings life.....yrs. Depreciation charge per ton $.....
Pumps and pipe lines life.....yrs. Depreciation charge per ton $.....
(If unable to itemize as above) Depreciation charge per ton produced $.....
Interest on investment per ton Quarry $..... Interest on investment per ton Plant $.....
Taxes, charge per ton produced $.....
Miscellaneous overhead fixed charges per ton (Includes Gen. Office, Sales, etc., expense) $.....

(4) Form 3. Deals with primary and secondary quarry drilling, and blasting and loading.

(5) Form 4. Deals with transportation between quarry face and crushers and primary and secondary crushing.

(6) Form 5. Deals with fine grinding machinery, screening, washing, and drying.

(7) Form 6. Deals with elevating, conveying, storage and pumping.

(8) Form 7. Lists all overhead charges and depreciation life of equipment as well. Answers are requested in such detail as your records allow.

(9) It is requested that a separate questionnaire be filled out for each quarry.

(10) Cost figures are requested for the calendar year 1927.

Holston Quarry Transferred to American Limestone Co.

COMPLETE operation of the Holston Quarry Co.'s quarry at Strawberry Plains, Tenn., producing approximately 40 carloads of limestone daily, has been transferred to the American Limestone Co., Knoxville. Thomas McCroskey, general manager of the limestone company, announced recently.

R. R. Immel, superintendent of the limestone company, will be general superintendent of the quarry hereafter. This is one of the largest limestone quarry operations in the south and produces approximately 500,000 tons of limestone annually. More than 100 men are now employed in the quarry. The production will probably be increased in the future, Mr. McCroskey said.—*Knoxville* (Tenn.) *News-Sentinel.*

Hints and Helps for Superintendents

Simple Bin Foundations

THE PLANTS ALONG the Arkansas River, and in many other parts of the Trans-Mississippi section of the country, use bins that are an equilateral triangle in section. They are all sand plants and the purpose of the bin is to settle the sand (or sand-gravel) and to have storage enough, at the same time, to allow cars to be changed without any sand and water being spilled on the track.

These bins are supported on one edge, as the cuts show, and the foundation required may be made very simple. Four posts of reinforced concrete support a steel beam above which a channel is placed. A timber "plate" resting on this serves for the bottom of the bin.

To prevent the bin from overturning, ties of 6x6 timber are carried to a concrete post so that the tie will be high enough to clear the track. Two of these ties show in the picture of the end of the bin. One is carried to a concrete post, the other to a building belonging to an older plant.

The down spout that takes away the overflow shows in front of one of the posts. It discharges into a gutter which is covered over. The end of the down spout is held clear of the ground so that the flow can be seen by supporting it on a kind of bridge. This foundation is used at one plant of the Consumers Sand Co., Topeka, Kansas.

End of bin, showing timber bracing tie

Concrete posts and a steel beam make simple type of foundations for wedge-shaped bin

Some Hints on Underground Mining

W. L. HOME
Mining Engineer, Pine Plains, N. Y.

IN CERTAIN districts in the crushed stone industry, underground mining methods instead of open face quarrying of stone is becoming of more and more interest. To operators who though highly successful in quarrying but who know little concerning mining methods and are considering changing over the following remarks may be of some value.

Underground mining is a highly specialized business in which there are many practical kinks. Men who have spent their lives working in open face quarries can no more be expected to know about underground operations than the underground miner can be expected to know all about well drills and steam shovels. A good quarryman may be a mighty poor miner and after all a lot depends on the kind of labor employed. If underground work is to be started do not look over your neighbor's property and decide you know it all and that with one good man in charge you can immediately convert your old quarrymen into miners. I have found that some never do fit in. They can learn in time but in this day and generation time is money. Start with whoever is to have charge of the operation and be sure that he is an all around first class underground miner. Do not then expect him to teach all your quarrymen the business of working underground. No matter how far you have to go to get them, get hold of a reasonable number of honest-to-goodness miners to mix in with your local crew. Do not procrastinate on this because in the long run you will be ahead.

Next, if possible keep the old quarry in condition to operate until such time as the mine is properly developed, for your future success underground will largely depend on keeping ahead with proper development a year or so ahead. Remember always that a mine may be ruined in a short time by an operator so eager for production that he will rob the workings of stone that should not be taken out at that time. If you have a proper development program and live up to it the chances are you will have a mighty successful mine, otherwise the odds are so much the other way that in a short time you will probably have nothing. You could get by this way in the old quarry but once you dig in you will find that you now have a horse of another color.

Protecting Spider Arms and Caps on Gyratory Crushers

IN a plant recently visited the spider arms and caps on the gyratory crushers were badly worn by the extremely abrasive stone coming in contact with them, though the plant had been in operation but a few months. To protect these parts heavy angle irons were placed and fastened over them and the stone allowed to strike the irons instead

of the crushers. These irons lasted but a short time and had to be replaced. The operators replaced these angle irons by I-beams of about the same size, to allow the stone to fill up the channel of the I-beam, make its own bead and overflow into the crushers. The stone would then take the wear instead of the iron.

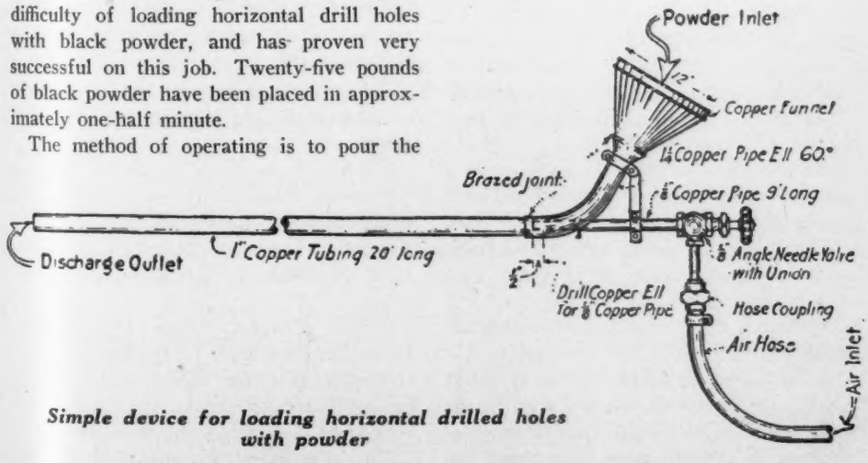
When one side of the I-beam eventually wears down it can be inverted and the other side turned up. On the reduction crushers there was no protection to the crushers at all and it was explained that any protection provided obstructed the flow of the material. Here the crusher caps were almost gone, but the spider arms were not so bad. The suggestion here was to get two pieces of pipe, one almost as large as the outside diameter of the cap and the other having its outside diameter just a little less than the inside diameter of the larger one, so the large pipe would just fit over it. The larger pipe was just long enough so that when placed on the crusher cap in a vertical position the top of the pipe would be a few inches above the top of the crusher cap and the smaller pipe was a ring about 4 or 5 in. high. By attaching the smaller pipe by welding or bolts to the cap the larger pipe could be slipped over it and held fast there but easily removed if necessary. When this large pipe filled with stone the crusher would be protected and the flow of stone would not be stopped in any way. The entire contrivance could also be quickly removed for oiling or other purposes.

Powder Loading Device

THE accompanying sketch, reproduced from *California Highways* and *Public Works,* shows a powder loading device designed by M. L. Sullivan, superintendent of construction, Division VII, of the California state highway system.

The device was designed to overcome the difficulty of loading horizontal drill holes with black powder, and has proven very successful on this job. Twenty-five pounds of black powder have been placed in approximately one-half minute.

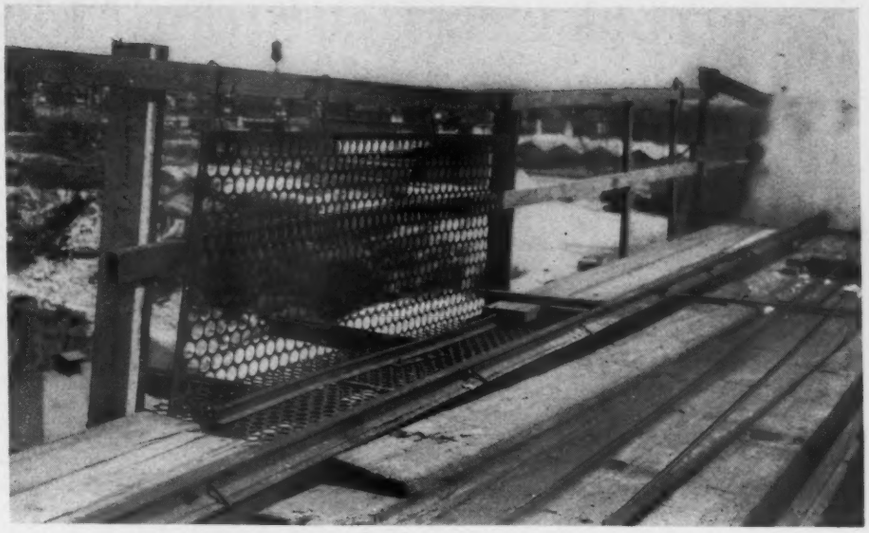
The method of operating is to pour the powder from the can into the funnel shown on sketch as "powder inlet." Then, on releasing the compressed air, furnished by the compressor on the job, through the ⅛-in. bronze needle valve, the powder is carried through the 1-in. copper tubing to the bottom of the hole. As the hole is filled with powder the tube is gradually withdrawn.



Simple device for loading horizontal drilled holes with powder

Screening Prevents Stone Falling Outside When Dumping to Kilns

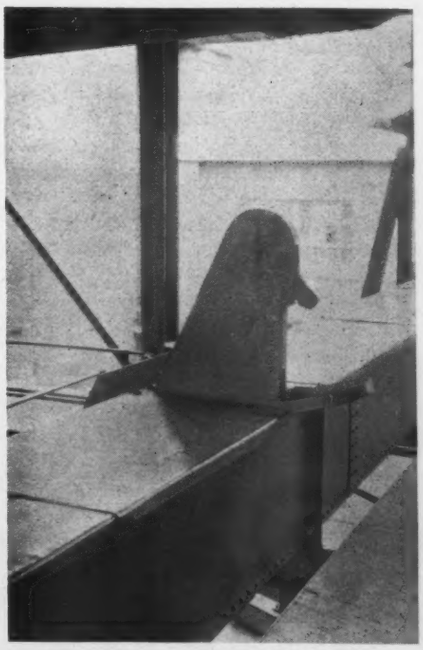
THE accompanying illustration shows how old screening from any large size screen can be used to prevent rock from falling outside when dumping into kilns or hoppers, since this would undoubtedly be a real source of danger if it were not for the guards. The picture was taken on the top of the lime kilns of the Riverside Stone and Lime Co., Lyons, Ill., where the quarry cars dump kiln stone directly to the kilns from the track. The openings in the platform around the top of each kiln, as well as the railing on either side at those points, are carefully covered with the screening, held in place by short lengths of discarded quarry-track rail, so there is no possibility of flying stone falling to the ground near the kilns where men are constantly at work.



Screening in place on top of lime kiln prevents stone from falling to yard below

A Sampler for Slurry

THE curious looking affair shown in the accompanying picture is a sampler for cement slurry used in the plant of the Louisiana Portland Cement Co. at New Orleans, La. In the upper part of the casing is a grooved pulley on which is an endless rope. The rope passes around a part of the shaft of the screw conveyor (in the box below) on which there are no flights.



An unusual sampler for cement slurry

As the conveyor shaft turns the rope is brought up and over the pulley and the adhering slurry falls off at the little spout shown. A vessel can be placed on the shelf below to catch the sample at regular intervals or continuously as desired. When the vessel is not on the shelf the sample of slurry runs back into the conveyor box.

New York Crushed Stone Men Discuss State Lien Law

First 1928 Meeting of State Association Held in Buffalo, March 30

THE FIRST MEETING IN 1928 of the New York State Crushed Stone Association was held in the Statler hotel in Buffalo, Friday, March 30. It had been planned that the meeting would include an automobile trip to Chippewa, across the Canadian border, but the weather was so bad that this was given up.

Twenty-one members and guests sat down to lunch when the meeting was opened by President George E. Schaefer.

Credit Protection for Producers

The topic discussed for the greater part of the time was the advisability of a new mechanic's lien law in the state of New York, which some other organizations are trying to have passed. The present law is thought insufficient to protect producers of construction materials. A letter from the New York division of the state highway contractors branch of the Associated General Contractors was read by President Schaefer. It asked that a committee from the New York State Crushed Stone Association be appointed to confer with committees from the Empire State Sand and Gravel Association and the contractors' association, and it pointed out that under the present law the material men were not sufficiently protected from an irresponsible contractor.

Commenting on the letter, President Schaefer said it had been reported to him that there had been instances of state highway contractors having to leave contracts unfinished because they had put in too low a bid. It was said that the highway department officials had stated unofficially that they wanted to see no more bids of this kind submitted; they wanted only bids from responsible contractors who knew how to estimate the cost of the work, and they wanted such men to make a fair profit, believing that this was not only better for the state but cheaper in the end.

John Rice said that in Pennsylvania the bills for material were covered by the contractor's bond, the same as the bills for labor were covered. He thought that was the best and fairest way. But an attempt to pass a law similar to that of Pennsylvania in New York had met with defeat. Mr. Hooker said that was true and it was also true that contractors were opposed to such a law because it would increase the bonds and the cost of bonding. One authority had figured out that an increase of $7,000,000 in bonds would be needed.

Frank Owens, secretary, said there were undoubtedly contractors who should not be awarded contracts, and he gave an instance of one man who had secured a good sized contract which he tried to "peddle around" among other contractors, as he himself had neither the capital nor the equipment to do the work. The law provides that the lowest bidder shall receive the bid and this law makes such a contractor a menace to both material men and contractors. He thought that any arrangement that would tend to eliminate such contractors would be good.

After further discussion, W. L. Sporborg suggested that a committee be sent to the conference to receive such suggestions as the committees from the contractors association and other associations had to offer. He moved that the president and five members to be chosen by the president be such a committee and this motion was carried. Albert Owens, J. L. Heimlich, A. L. Hooker, S. D. Ormsby and J. E. Cushing were selected.

Fairly Good Year in Prospect

After this matter was decided the president called for reports on the amount of work which was in sight for the 1928 season. He led off by stating that it had been unofficially reported to him that it was the estimate of the highway department that about 900 miles of road would be constructed this year. It was probable in his opinion that from $5,000,000 to $6,000,000 more than was spent in 1927 would be spent on highways in 1928.

Counties and towns would do about the same amount of road building this year as last, judging from the estimates he had received from a number of engineers. Grade-crossing elimination work would also be continued at about the same rate as in 1927. He called on a number of members for their opinion of how much ballast would be needed and these said that the contracts they had made and the prices obtained had been practically the same as in 1928.

Regarding street paving and general building in towns and cities the prospects were not thought so good. It was estimated that in Rochester, for example, general building would be 15% to 20% less than last year.

In the course of this discussion President Schaefer brought out the fact that in the towns and cities of New York state the consumption of crushed stone was about one ton per year per capita. It varied from year to year, but this was the average for some years back. John Rice confirmed this and said that he had found the same relation to be true about 15 years ago when he first began to study it.

New Type Two-Course Concrete Roads

Two-course concrete roads were also discussed in this part of the session. It was explained after the meeting that this type of road is one with which the highway department is experimenting at the present time. A base is laid in the usual way and covered with burlap or similar material. On top of this a mortar top made of cement, pea gravel and sand is laid, the idea being to provide a top that can be easily repaired and replaced at a much lower expense than that of replacing the whole road slab.

Compensation Insurance

President Schaefer asked if anyone knew of changes in compensation insurance rates. W. L. Sporborg reported that the governor had signed six amendments to the present insurance law, but he himself had not studied them enough to say what their effect would be.

A. S. Owens reported that he was carrying two classes of insurance. The men in the quarry were classified as quarry workers and the men in the mill as factory workers. In this way a lower general rating was secured. It was possible for him to do this because the plant was sufficiently distant from the quarry to remove the men from quarry hazards.

John Rice gave the experience of his company in carrying its own insurance and said that it had proved very profitable. Some other features of insurance were discussed, especially the amount allowed for maintaining safety organizations.

Registration

The following companies were represented:

General Crushed Stone Co., Easton, Penn.: John Rice and George E. Schaefer, president of the New York State Crushed Stone Association.

Rock-Cut Stone Co., Syracuse: W. L. Sporborg and Francis C. Owens, secretary of the association.

Genessee Stone Products Co., Batavia: C. L. Bucholtz, A. B. Caldwell and D. N. Boyce.

Wilshire Stone Co., Gasport: W E. Foote.

Dolomite Products Co., Rochester: John Odenbach and Paul Odenbach.

Le Roy Lime and Stone Co., Le Roy: J. L. Heimlich, D. L. Moore and D. E. Moore.

Buffalo Crushed Stone Co., Buffalo: James Savage and A: L. Hooker.

Albany Crushed Stone Co., Albany: Ernest Hendricks.

Peerless Quarries, Inc.: A. S. Owens.

The following were guests: H. Coneley, Union Explosives Co., Le Roy; David Cheeney, Marion Stone Shovel Co., Marion, Ohio; W. A. Anderson, Hercules Powder Co., Buffalo; Edmund Shaw, ROCK PRODUCTS, Chicago.

Editorial Comment

Concrete and Building Codes

Committees are at work on the revision of the building codes of New York, Chicago and Philadelphia and there is a hope that concrete may be more fairly treated than it was when the present codes were adopted. Present day codes reflect the ideas of a former generation of engineers who had neither our knowledge of concrete nor the ability to design it for a predetermined strength. Hence they considered it good enough for foundations, but not sufficiently reliable to be used for the better classes of construction. The allowable strengths are absurdly low, viewed in the light of our present knowledge of designing concrete structures.

Speaking of this before the Western Society of Engineers recently, Arthur R. Lord, designer of the Wacker Drive project, said:

"On these advances (in our knowledge of concrete) our present code and similar ordinances in other cities are silent. If they were incorporated into and recognized by the codes, building costs could be cut, rents could be lowered, and the general public would benefit by lower prices because merchants' overhead would be reduced. For example, the present Chicago code specifies six sacks of cement to a yard of concrete in order to secure a strength of 2,000 lbs. Yet our experience with Wacker Drive showed that with exactly the same materials we can get 3,500 lbs., or an increase of 75% in strength without any additional cost."

The report of the building codes committee presented at the recent meeting of the American Concrete Institute said the same thing in greater detail, and it showed that if its standard code were adopted, the cost of building in Chicago would be cut 8%.

Precast units have suffered even more than mass concrete from unfair building codes. At every meeting the editors of Rock Products have attended, the matter has come up in one way or another. In some cities codes have created an absurd situation, concrete block and tile being used for the better residences in the suburbs while across the city line it could not legally be used for even the poorer types of construction.

Much of the effort to hold back mass concrete and precast units, we know, has been due to the organized opposition of the manufacturers of certain other building materials. But that opposition is weakening daily. It is impossible to conceal the truth about concrete and as the public learns it there will be insistence on the public's right to use it legally. The revisions of the state codes of Wisconsin and Ohio and the right to use concrete block instead of brick in sewer construction near Chicago are a few of the results of such a demand.

"The Battle of the Aggregates"

The competition of aggregates appears to be growing more interesting. So far, at least, it is friendly competition, and ethical. We believe every step in the direction of increasing our knowledge of aggregates will make for better and cleaner competition, and will prove helpful to producers of all kinds of aggregates, eventually, if not immediately. We see no cause yet, nor do we expect to see any, for producers of any kind of aggregate to feel uneasy about their investments. It is obvious, of course, that an evaluation of aggregates along the lines suggested by A. T. Goldbeck would make possible keener competition between stone and gravel; but there is also the likelihood that this competition between *good* stone and *good* gravel will help effectively to eliminate altogether poor roadside gravel in favor of one or the other commercial aggregates—thus helping *all* commercial aggregate producers.

If the criterion on all concrete paving jobs were raised to an alleged crushed-stone standard, probably the additional materials required on jobs where gravel is used would more than compensate for jobs lost to crushed-stone because of the equalization in aggregate costs. Of course, in a great many localities it is going to be found that the local gravel is equal, and in some instances superior to the local crushed stone; in which case, the rule works both ways and the tables will be turned and a thicker concrete pavement will be required with the poorer stone aggregate, than with the better gravel aggregate.

Granting that crushed-stone producers are able to establish indisputably that a particular crushed-stone concrete is stronger in cross-bending strength than a particular gravel concrete and that it is necessary to make the gravel concrete road slabs ½ in. or more thicker for the same, or equal, cross-bending strength; granting all this, how is the gravel producer hurt? The crushed-stone producer is helping sell more sand and gravel, that's all. For there is enough difference in cost of production and selling price between gravel and crushed stone to make it possible in most instances for 6½-in. gravel concrete to compete with 6-in. crushed-stone concrete, even though it will require more cement, labor, etc., as well as more sand and gravel, but at that the score is probably about equalled on most jobs.

It is our firm conviction that the law of averages will apply and that unqualified acceptance of the conclusions drawn from the New Jersey tests would not change the relative consumption of the two types of aggregates appreciably over any period of time. But one result should be better concrete roads — which would be profitable to *all* aggregate producers.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. com.[37]	12-30-27	3	7	
Allentown P. C. 1st 6's[37]	12- 5-27	90	92	
Alpha P. C. new com.	4- 7-28	37	40	75c qu. Apr. 14
Alpha P. C. pfd.	4- 7-28	116	.....	1¾% qu. June 15
Am. L. & S. 1st 7's[22]	2-24-28	101¾	102½	
Arundel Corp. new com.	4-11-28	47½	48	50c qu. Apr. 2
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	4-11-28	108	112	
Atlas P. C. com.[3]	4- 7-28	42	45	50c qu. Mar. 1
Atlas P. C. pfd.	4- 7-28	44	.....	66⅔c qu. Apr. 2
Beaver P. C. 1st 7's	7- 9-27	100	100	
Bessemer L. & C. Class A[4]	4-10-28	36½	37	75c qu. Feb. 1
Bessemer L. & C. 1st 6½'s[4]	2-24-28	100¾	.....	
Boston S. & G. com.[16]	4- 9-28	77¼	80	$1 qu., $1 x. Jan. 2
Boston S. & G. pfd.	4- 7-28	90	.....	1¾% qu. Jan. 1
Boston S. & G. 1st pfd.	4- 7-28	95	.....	2% qu. Jan. 1
Canada Cement com.	4-11-28	31	32	
Canada Cement pfd.[40]	4-10-28	98⅞	100	1.62½ qu. Mar. 31
Canada Cement 5½'s	4- 9-28	102⅛	102⅛	
Canada Cr. St. Corp. 1st 6's	3-24-28	97	100	
Chas. Warner com.[16]	4- 9-28	35	38½	50c qu. Apr. 10
Chas. Warner pfd.[16]	4- 9-28	107	.....	1¾% qu. Jan. 26
Cleveland Stone new st'k	4-10-28	77	79	50 qu. June 1
Consol. Cement 1st 6½'s, A[43]	4-11-28	96	99	
Consol. Cement 6½ notes[24]	4-11-28	94	98	
Consol. Cement pfd.[41]	4-11-28	50	65	
Consumers Rock & Gravel 1st 7's[18]	3-23-28	99½	101½	
Coosa P. C. 1st 6's[23]	12-28-27	65	75	
Coplay Cem. Mfg. 1st 6's[40]	4- 9-28	90	.....	
Coplay Cem. Com.[40]	4- 9-28	12½	.....	
Coplay Cem. pfd.[40]	4- 9-28	72½	.....	
Dewey P. C. 1st 6's[20]	4-11-28	99	101	
Dolese & Shepard[7]	4-11-28	155	.....	$2 Apr. 1, $1.50 ex. Apr. 1
Edison P. C. com.[30]	4- 9-28	50c	1½	
Edison P. C. pfd.[30]	4- 9-28	1	3	
Edison P. C. bonds[30]	4- 9-28	75	.....	
Fredonia P. C. 1st 6½'s[22]	12-28-27	97	101	
Giant P. C. com.	4- 9-28	30	40	
Giant P. C. pfd.	4- 9-28	35	45	3½% Dec. 15
Ideal Cement com.	4-11-28	110	113	$1 qu. Apr. 2
Ideal Cement pfd.[33]	4- 9-28	110½	112	$1.75 qu. Apr. 2
Indiana Limestone 6's	4-11-28	98¾	99	
International Cem. com.	4-11-28	69½	69⅞	$1 qu. Mar. 30
International Cem. pfd.	4-11-28	109⅜	110	1¾% qu. Mar. 30
Kelley Is. L. & T. new st'k	4-10-28	45	50	62½c qu. Apr. 2
Lawrence P. C.[3]	4- 7-28	108	112	1½% qu.
Lehigh P. C.	4-11-28	52½	52½	62½c qu. Jan. 1
Lehigh P. C. pfd.	4-11-28	108¾	108¾	
Lyman-Richey S. &. G. 1st 6's, 1931[13]	8-12-27	99½	100	
Lyman Richey S. & G. 1st 6's, 1935[13]	8-12-27	97½	99	
Marblehead Lime 1st 7's[14]	4- 7-28	100	.....	
Marbleh'd Lime 5½'s,notes[14]	4- 7-28	98	.....	
Mich. L. & C. com.	4- 9-28	35	.....	
Mich. L. & C. pfd.[6]	4- 9-28	24	26	1¾% qu. July 15
Missouri P. C.	4-11-28	42½	43	50c Feb. 1
Monolith P. C. com.[9]	4- 6-28	15½	16	8% ann. Jan. 2
Monolith P. C. pfd.[9]	4- 6-28	9½	9¾	
Monolith P. C. units[9]	4- 6-28	34½	35½	
National Cement 1st 7's[38]	3-24-28	96	99	
National Gypsum com.[35]	4-11-28	16	18	
National Gypsum pfd.[35]	4-11-28	60	63	1¾% qu. Apr. 1
Nazareth Cem.[25]	4- 7-28	31½	33	75c qu. Apr. 1
Newaygo P. C.[1]	12-30-27	115	.....	
Newaygo P. C. 1st 6½'s[23]	2-11-28	120	.....	
New Eng. Lime pfd., A[14]	4- 7-28	.....	95	
New Eng. Lime pfd., B[22]	4- 7-28	96	98	
New Eng. Lime, V.T.C.[22]	4- 7-28	34	36	
New Eng. Lime 1st 6's[14]	4- 7-28	98	100	
N. Y. Trap Rock 1st 6's[22]	4-10-28	103	103	
North Amer. Cem. 1st 6½'s	4-10-28	90	90½	
North Amer. Cem. units[19]	4- 9-28	50	55	2 mo. per. at 7%
North Amer. Cem. com.[19]	4- 9-28	10	12	
North Amer. Cem. pfd.[19]	4- 9-28	45	50	$1.75 qu. Aug. 1
North Shore Mat. 1st 6's[15]	4-11-28	99	99½	
Northwestern States P. C.[37]	11-21-27	165	170	
Pac. Coast Cem. 6's, A	2-17-28	95½	.....	
Pacific P. C. new com.	4- 6-28	.....	24	
Pacific P. C.	4- 5-28	76⅜	80	25c mo.
Pacific P. C. pfd.	4- 6-28	76⅜	80	1.62½ qu. Apr. 5
Pacific P. C. notes[5]	3-22-28	99	.....	3% s.-a. Oct. 15
Pacific P. C. 6's	4- 6-28	.....	99	
Peerless Egyp'n P. C. com.[21]	4- 7-28	3	3½	
Peerless Egyp'n P. C. pfd.[21]	4- 7-28	90	95	1¾% qu. July 1
Peerless Egyp'n P. C. war.[21]	4- 7-28	No market		
Penn-Dixie Cem. 1st 6's[20]	4-11-28	100¾	101	
Penn-Dixie Cem. pfd.[28]	4-11-28	95	96	1¾% Mar. 15
Penn-Dixie Cem. com.[28]	4-11-28	26	.....	50c April 1
Petoskey P. C.[1]	4-11-28	12½	13½	1½% qu.
Pittsfield L. & S.[31]	10- 8-27	.....	100	
Pittsfield L. & S. com.[31]	10- 8-27	.....	25	
Riverside P. C.	4-10-28	195	200	50c mo.,$1.50 x. Aug. 1
Rockland-Rockport Lime 1st pfd.[34]	4- 7-28	.....	100	3½% s.-a. Feb. 1
Rockland-Rockport Lime 2nd pfd.[34]	4- 7-28	.....	65	3% s.-a. Feb. 1
Rockland Rockport Lime com.[34]	4- 7-28	.....	50	1½% qu. Nov. 2
Sandusky Cem.	4-10-28	175	200	$2 qu. Apr. 2
Santa Cruz P. C. bonds	4- 5-28	105¾	.....	6% annual
Santa Cruz P. C. com.	4- 5-28	93	99	$1 qu. Apr. 1
Schumacher Wallboard com.	4- 6-28	24½	24⅝	
Schumacher Wallboard pfd.	4- 6-28	26	27¼	
Southwestern P. C. units	5-11-27	205	.....	
Superior P. C., A[30]	4- 6-28	48½	49½	
Superior P. C., B[30]	4- 6-28	33½	34½	
Trinity P. C. units[37]	4- 7-28	152	158	
Trinity P. C. com.[37]	4- 7-28	52	.....	
United Fuel & Sup. 1st 6's[27]	7-14-27	98	100	
United Fuel & Sup. notes[27]	7-14-27	98	100	
U. S. Gypsum com.	4-11-28	74	75	40c qu. Mar. 31
U. S. Gypsum pfd.	4-11-28	124	.....	1¾% qu. Mar. 31
Universal G. & L. com.[3]	4-11-28	2	3	
Universal G. & L. pfd.[3]	4-11-28	.....	23	1½% Feb. 15
Universal G. & L., V.T.C.[3]	4-11-28	2	4	
Universal G. & L. 1st 6's[3]	4-11-28	65	70	
Upper Hudson Stone 1st 6's, 1951[32]	12-28-27	92	.....	
Vulcanite P. C. 1st 7½'s[22]	12- 5-27	105	109	
Whitehall Cem. Mfg. com.[26]	4- 9-28	150	.....	
Whitehall Cem. Mfg. pfd.[26]	4- 9-28	95	.....	
Wisconsin L. & C. 1st 6's[15]	4-11-28	100	.....	
Wolverine P. C. com.	4-11-28	6	6¼	15c Feb. 15
Yosemite P. C., A com.	1- 4-28	6	.....	

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willet, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]Pirnie, Simons and Co., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]A. C. Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick and Co., Montreal, Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, Chicago, Ill. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal Que.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Asbestos Corp. of Amer., 5 sh. pfd., 5 sh. com.[1]	$1 for the lot	.....
Atlanta Shope Brick and Tile Co[1]	25c	.....
Benedict Stone Corp. (cast-stone), 50 pfd., 390 com.[1]	$400 for the lot	.....
Benedict Stone Corp. 1st 7's 1934[8]	.....	86
Blue Stone Quarry, 60 sh.[3]	$10¼ for the lot	.....
Eastern Brick Corp., 7% cum. pfd.[1]	40c	.....
Eastern Brick Corp. (sand lime brick) com.[1]	40c	.....
International Portland Cement Co., Ltd., pfd.	30	45
Globe Phosphate Co., $10,000 1st. mtg. bonds, $169.80 per $1000 paid on prin.	$50 for the lot	.....
Iroquois S. & G. Co., Ltd., 2 sh. com., 3 sh. pfd.[1]	$12 for the lot	.....
Knickerbocker Lime Co.[4]	105	.....
Limestone Prod. Corp., 150 sh. pfd., $50 par, and 150 sh. com., no par	$60 for the lot	.....
Missouri Portland Cement Co., 7% serial bonds	104¾	104¾
Olympic Portland Cement Co.[7]	.....	£1⅜
Phosphate Mining Co.[1]	1	.....
River Feldspar & Mill'g Co., 50 com., 50 pfd.[3]	$200 for the lot	.....
Rockport Granite Co., 1st 6's, 1934	90	.....
Simbroco Stone Co.[2]	12	12
Southern Phosphate Co.[6]	1¼	.....
Standard Gypsum Co., 10 sh. pfd., 5 sh. com.[2]	$35 for the lot	.....
Tensas Gravel Co., 180 sh. con.[1]	$1 for the lot	.....
Tidewater Portland Cement Co., 3000 sh. com.	$6525 for the lot	.....
Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6]	$1 for the lot	.....
Wabash Portland Cement Co.[1]	60	100
Winchester Brick Co., pfd., sand lime brick[5]	10c	.....

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price obtained at auction by R. L. Day and Co., Boston. [3]Price obtained at auction by Weilupp-Bruton and Co., Baltimore, Md. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, on April 4, 1928. [5]Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass. [7]Neidecker and Co., London, England. [8]Auction sale of $1000, Barnes & Lofland, Philadelphia, March 31, 1928.

Financing Canada Gypsum and Alabastine, Ltd.

AS NOTED on p. 72, ROCK PRODUCTS, March 31, 1928, the Canada Gypsum and Alabastine, Ltd., has purchased the Manitoba Gypsum Co., Ltd., and the British Columbia Gypsum Co., Ltd. The Royal Securities Corp., New York City, is offering at 97½ and interest $2,500,000 5½% first mortgage 20-year sinking fund gold bonds, series A.

Dated March 1, 1928; due March 1, 1948. The principal and interest (March and September) is payable in Canadian gold coin or its equivalent at Canadian Bank of Commerce, Paris, Ont., Montreal, Toronto, Halifax, St. John, Charlottetown, Quebec, Ottawa, Hamilton, Winnipeg, Edmonton, Calgary, Regina, Vancouver or Victoria, or, at the option of the holder, in United States gold coin or its equivalent at the agency of the Canadian Bank of Commerce, New York, or in sterling at Canadian Bank of Commerce, London, England, at the fixed rate of $4.86⅔ to £1. Denomination of the bonds are $1,000 and $500. Redeemable all or part on 60 days' notice at a premium of 5% up to and including February 28, 1929, and thereafter up to and including February 28, 1947, at a premium of 5% less ¼ of 1% for each calendar year or part thereof of their currency, and after February 28, 1947, until maturity without premium; in each case with accrued interest. The trustee is Montreal Trust Co.

Capitalization—

	Authorized	Outstanding
1st mtge. sinking fund gold bonds	$4,000,000	*$2,500,000
6% 20-yr. gold debentures	1,000,000	1,000,000
Common (no par) shares	100,000	75,994

Data from Letter of R. E. Haire, President of the Company

The Canada Gypsum and Alabastine, Ltd., is the largest Canadian manufacturer of gypsum products; the sole producer in Canada of "alabastine," and a large manufacturer of hydrated lime and other lime products. The business of the company and its predecessors has been in successful operation since 1886. Company is now acquiring the business and properties of Manitoba Gypsum Co., Ltd., which has for many years carried on the manufacture of gypsum products, lime, etc., and of its subsidiary British Columbia Gypsum Co., Ltd. On acquisition of these properties the company will control the total present production in Canada of "gyproc" wallboard, blocks, laths, partition and roof tiles, manufactured from gypsum, "insulex" and alabastine, and will be one of the largest Canadian producers of hard wall plaster, plaster of paris, hydrated lime and other lime products.

The plants and properties of the company and those now being acquired include mills at Caledonia and Lythmore, Ont., Montreal, Que., Winnipeg, Man., and Port Mann, B. C., for the manufacture of gypsum products, and in addition plants at Paris, Elora and Teeswater, Ont., for the manufacture of alabastine, plaster, lime, etc. Company controls at Caledonia, Ont., adjoining its principal eastern mill, a developed mine containing large reserves of raw gypsum and will control at Gypsumville, Man., the only developed gypsum deposits in Manitoba, estimated to contain practically an unlimited supply of raw gypsum; and an additional mine at Falkland, B. C. Other developed mines are owned or controlled by the company at Lythmore, Ont., and Mabou, N. S.

Sinking Fund.—The trust deed will provide for an annual cumulative sinking fund for the redemption of first mortgage bonds of a sum equal to 2½% of all bonds issued, plus interest on bonds redeemed, commencing March 1, 1929. It is estimated that this will be sufficient to retire at par by maturity more than 80% of bonds now being issued.

Sales.—Growth of the business of the combined properties is shown by the following tabulation of consolidated sales for the five years 1923 to 1927 inclusive:

1923	$2,206,640	1926	$3,443,315
1924	2,103,847	1927	4,175,342
1925	2,373,953		

Purpose.—Proceeds will be applied toward retiring the presently outstanding 6½% bonds and toward the purchase of the business and assets of Manitoba Gypsum Co. and of its subsidiary, British Columbia Gypsum Co.

Earnings.—Based upon annual profits of the company for the three years ended May 31, 1927, and of properties now being acquired, for the three years ended October 31, 1927, consolidated annual profits after depreciation and depletion but before Dominion income tax, and available for bond interest, were:

	—Years ended May 31 and October 31— 1925	1926	1927	Year ended Dec. 31, '27
Consolidated profits	$420,359	$548,830	$731,968	$819,463
Provision for depreciation and depletion	116,920	149,296	174,266	174,317
Provision for income tax at the present rate	24,115	31,802	44,456	51,451
Net profits	$279,323	$367,731	$513,245	$593,694

Rights.—The stockholders of record March 13 have been given the right to subscribe for additional capital stock (no par value) at $40 per share on the basis of two new shares for each five shares owned. Dividends at the rate of $3 per annum (75 cents quarterly) are being paid on the issue.

The stockholders on March 8 approved the acquisition of the property and business of the Manitoba Gypsum Co., Ltd., and of its subsidiary, the British Columbia Gypsum Co., Ltd., and also approved the above financing.

Financing a New California Sand and Gravel Plant

THE PACIFIC ROCK CO., Oakland, Calif., is offering to the public 10,000 class "A," no par value, non-callable and non-assessable shares.

The company has purchased 68 acres of sand- and gravel-bearing ground in the town of Centerville at the intersection of the Dumbarton bridge road and the Oakland-San Jose highway. The deposit is part of the so-called Alameda creek gravel beds, which for many years have been commercially mined and sold for building purposes around the metropolitan area of San Francisco bay. Another recent activity of the company is the acquiring of 525 ft. on the Southern Pacific company's right-of-way, adjoining the Centerville railroad station. A number of bankers and business men in Alameda county are interested in the company.

Certain unusual advantages of operation are pointed out by officials of the company. The company's deposit is one of the last remaining properties of commercial value within a short distance of the San Francisco bay market. Its strategic location at the junction of two important highways and on the main line of the Southern Pacific enables more rapid delivery to markets. An abundance of water enables the company to triple-wash its products, permitting a higher quality of clean rock products at no greater cost, according to officials of the company. The management of the company is in the hands of Lee A. Frontz, who for 15 years has operated rock companies in Alameda county and was one of the founders of the California Rock Co. of Elliott, Calif.

The company which is offering 10,000 shares of class "A," no par value, non-callable and non-assessable stock, has been authorized to issue 15,000 shares of class "A" stock and 5,000 shares of class "B" stock. The shares are free from personal property tax in California and dividends are exempt from normal federal income tax. The company has no bonded debt and no preferred shares.

Class "A" stock is entitled to preferential cumulative dividends at the rate of $2 per share per annum, payable semi-annually beginning July 1, 1929, and is participating to the extent of 65% of further earnings after a surplus is set aside equal to $2 per share of the class "A" stock outstanding and after a dividend of $2 per share per annum is paid on the outstanding class "B" stock. In event of liquidation of the company, class "A" common shares are preferred to the extent of $30 per share, plus 65% of any undistributed surplus earnings. Class "A" shares are being offered by Loring & Frank at $25 per share.—*Oakland* (Calif.) *Tribune.*

Lehigh Portland Preferred Offered

EDWARD B. SMITH AND CO. and Brown Bros. and Co. are offering at 107 and dividend 10,000 shares (par $100) 7% cumulative preferred stock of the Lehigh Portland Cement Co. The offering does not represent new financing by the company.

The following data are from a letter of General Harry C. Trexler, president of the

Lehigh Portland Cement Co.:

Capitalization—	Authorized	Issued
Preferred stock, 7% cumulative (par $100)	$30,000,000	$22,517,400
Common stock (par $50)	30,000,000	22,517,400

History—Company was incorporated in Pennsylvania, November 26, 1897. Company at present operates 20 mills throughout the United States and is engaged in the production of the extensively advertised and well-known "Lehigh cement." Company is the largest producer in the cement industry, having produced during the five years ended November 30, 1927, over 11.5% of the total cement produced within the United States during such period. The mills are strategically located for distribution of the company's product and have an annual capacity of more than 23,400,000 bbl. of portland cement.

Sinking Fund—Company will set aside as a sinking fund, on October 1, 1928, and annually on the same date in each year thereafter, an amount equal to 1½% of the greatest aggregate par amount of the preferred stock theretofore issued, to be applied to the purchase or redemption of preferred stock.

Listing—Application will be made to list this preferred stock on the New York Stock Exchange.

Earnings—The annual net earnings of the company for the five fiscal years ended November 30, 1927, after depreciation, depletion and federal income taxes, averaged $5,734,223, or over 3.6 times dividend requirements on 225,174 shares of preferred stock. Net earnings after all charges for the year ended November 30, 1927, amounted to $4,118,844, or over 2.6 times such preferred dividend requirements. Company has shown a net profit in each of the 30 years of its existence.

BALANCE SHEET NOVEMBER 30, 1927

(Giving Effect to Issuance of $22,517,400 7% Preferred Stock Declared as a Stock Dividend in December)

Assets—	
Cash	$ 5,527,034
Call loans	4,000,000
Liberty loan bonds	258,550
Working funds and advances	188,817
Accounts and bill receivable	1,711,270
Inventories at cost or market, whichever is lower	5,281,255
Investments and advances	3,399,481
Property account	33,686,411
Deferred charges	1,077,472
Total	$55,130,289
Liabilities—	
Accounts payable	$ 672,947
Accrued wages	214,665
Accrued taxes	142,518
Dividends payable January 3	562,935
Providing for federal taxes	652,125
Reserves	770,549
7% preferred stock	22,517,400
Common stock	22,517,400
Surplus arising from appropriation of mineral deposits	450,646
Earned surplus	6,629,104
Total	$55,130,289

The New York Stock Exchange has authorized the listing of $22,517,400 7% cumulative preferred stock (par $100) and $22,517,400 of common stock (par $50).

Financial Details of Pennsylvania-Dixie-North American Merger

NEGOTIATIONS between Pennsylvania-Dixie Cement Corp. and North American Cement Corp. have been carried to completion and plans have been made public for the consolidation of the two companies into a new corporation to be called General Cement Corp. Stockholders' meeting of Pennsylvania-Dixie Corp. has been called for May 2 to consider the consolidation.

Under the proposed consolidation the capitalization of the new company will consist of $12,422,000 6% first mortgage bonds; $287,000 first mortgage bonds of Acme Cement Corp.; $20,270,500 cumulative 7% preferred stock and 582,500 shares of no par common stock.

The 400,000 shares of Pennsylvania-Dixie common stock will be exchanged share for share into common stock of General Cement Co., while the 133,250 shares of North American common will be exchanged each for one-half share of the consolidated company. Pennsylvania-Dixie 7% preferred stock, consisting of 130,000 shares, will be exchanged share for share for the new 7% preferred, and holders of the 133,250 shares of North American preferred will receive two shares of common and in adjustment of accumulated dividends will also receive either $5.25 in cash or an additional one-quarter share of new common.

The $12,442,000 mortgage debt of Pennsylvania-Dixie Corp. will become an obligation of General Cement, as will the $287,000 Acme Cement mortgage bonds of North American. Holders of the $7,270,500 6½% North American debenture bonds will be offered new preferred stock at the rate of $500 par value of such stock for every $500 of debentures.

Property of General Cement Corp. will include 10 plants with a combined production of 14,000,000 bbl. annually. It is understood that combined net earnings of the two companies were sufficient to cover dividends on the amounts of stock to be outstanding after consolidation at the rates now being paid on Pennsylvania-Dixie common and preferred stock. It is probable that dividends on the common stock of the General Cement Corp. will be initiated at a $2 annual rate.

Operating costs of the combined properties will be among the lowest of any companies serving the same territories, while the geographical distribution of plants will afford access to all important markets of Atlantic seaboard states on a favorable basis as to freight rates and other shipping costs, according to John A. Miller, president of Pennsylvania-Dixie.

Management of the new company will be headed by Mr. Miller as chairman of the board and Frederick W. Kelley, president. Mr. Kelley is now presdient of North American Cement Corp.

Based on the balance sheets of the two companies as of December 31, 1927, current assets of General Cement Corp. would amount to $8,645,000, of which $3,438,000 would consist of cash and $1,146,000 in notes and accounts receivable. Current liabilities would figure at $1,552,000, leaving net working capital of $7,093,000.—*Wall Street News.*

INCOME ACCOUNT—FISCAL YEAR ENDED NOVEMBER 30

	1927	1926
Sales, less discounts, allowances, etc.	$27,642,843	$30,451,867
Manufacturing and shipping cost	16,701,564	17,341,914
Provision for depreciation, accrued renewals and obsolescence	2,222,740	2,670,796
Selling, administrative and general expense	4,221,720	4,564,024
Net profit from operations	$ 4,496,820	$ 5,875,133
Miscellaneous income	274,148	208,754
Total income	$ 4,770,969	$ 6,083,887
Provision for federal income tax	652,125	840,000
Net income for year	$ 4,118,844	$ 5,243,887
Balance at beginning of fiscal year	26,556,378	23,033,389
Adjustment unrealized surplus for stone removed	22,394	25,955
Total	$30,697,616	$28,303,231
Income taxes for prior years		172,693
Dividends declared	1,574,612	1,574,160
Surplus at end of year	$29,123,004	$26,556,378

Pacific Coast Company Earnings

REPORT OF PACIFIC COAST CO., Seattle, Wash., and subsidiaries for year ended December 31, 1927, shows net income of $4,437 after taxes, interest, etc., equivalent to 29 cents a share (par $100) earned on 15,250 shares of first preferred stock. This compares with $161,809 or $2.13 a share on 40,000 shares of second preferred stock in 1926, after dividends on first preferred stock.

The Pacific Coast Co.'s earnings in 1927, the company's thirtieth year, were $204,985 less than in 1926. This was due to continuation of heavy sales of fuel oil in the Seattle district and the necessity of shutting down three of its main mines on account of exhaustion and of bringing in three new mines to take their place, making 1927 a year of transition and adjustment.

President Barnum explains the reasons for the company's organizing its cement subsidiary, and states that Pacific Coast Co.'s investment in the new company will be $780,000, for which it will receive 5,500 shares out of the total of 7,500 shares of 7% preferred stock and 70,500 shares out of a total of 100,000 shares of common stock. The company's two partners in the cement company are a firm of cement plant engineers and operators and a banking and engineering firm familiar with the cement industry.

The cement plant should be in production the latter part of 1928. Already the company has purchased two Shipping Board 6300-ton steamers for transporting the lime rock from Alaska to the cement plant at Seattle. Including reconditioning, the cost of these two steamers will not exceed $120,000.

Mr. Barnum believes that at least one-third of the company's cement production will be moved to consumer without any rail charge, and that normal growth in the consumption of the western Washington market will take care of the increase in the cement production without any cutting of prices.

Benefits that Pacific Coast Co. will derive

from building the cement plant are the profits from manufacture and sale of cement, profits from sale of coal to the cement company, profits from transportation of additional coal, and saving in overhead expenses.

Mr. Barnum believes that the total of these items will make a very material addition to the company's earning power. These additions should make themselves felt early in 1929.—*Wall Street Journal.*

North American Cement Annual Report

NORTH AMERICAN CEMENT CORP., Albany, N. Y., reports net profit of $227,885 for 1927 after interest, depreciation, depletion and federal taxes, which is equivalent to $4.42 a share (par $100) earned on 51,500 shares of 7% preferred stock. This compares with a net profit of $1,082,912 for 1926 after depreciation and depletion, but before interest and federal taxes.

The income account for the year ended December 31, 1927, compares as follows:

NORTH AMERICAN CEMENT CORP., EARNINGS, 1925 TO 1927, INCLUSIVE

	1927	1926	1925
Net sales	$5,916,073	$6,095,888	$6,154,584
Cost of sales	3,676,391	3,827,906	3,331,993
Gross profit	$2,239,682	$2,267,982	$2,822,591
Selling & other expense	843,498	776,021	838,406
Int. & amortiz.	563,669	.....	40,083
Deprn. & depln.	605,480	477,502	442,065
Fed. taxes	36,810	.....	.....
Net profit	$190,225	$1,014,459	$1,502,037
Misc. earnings	37,659	68,453	50,687
Net earnings	†$227,884	*$1,082,912	*$1,552,724

*Before interest and federal taxes. †Before deducting dividends of $270,375 on the preferred stock.

BALANCE SHEET, DECEMBER 31, 1927

Assets:	1927	1926
*R. E., bldgs., equities, etc.	$13,707,236	$14,101,312
Cash	488,227	235,592
Accts. and notes receivable	297,080	415,523
Inventories	1,095,921	1,100,330
Investments	13,937	.....
Emp. stock subs.	30,749	60,891
Sinking fund	584	.....
Prepaid expenses	779,487	830,798
Totals	$16,413,221	$16,744,446
Liabilities:		
Preferred stock	$5,150,000	$5,150,000
†Common stock	1,412,500	1,412,500
Accounts payable	165,873	272,013
Accrued wages, int., etc.	220,932	‡271,370
Federal tax reserve	36,810	.....
Bonds	7,557,500	7,732,000
Reserves	54,935	50,659
Initial and earned surplus	1,814,671	1,855,904
Totals	$16,413,221	$16,744,446

*After depreciation and depletion. †Represented by 133,250 no par shares. ‡Includes federal tax reserve.

National Gypsum Co. Report

NATIONAL GYPSUM CO., Buffalo, N. Y., reports for the year ended December 31, 1927, earnings of $180,132.43 before depreciation and federal tax were deducted, and $109,383.63 after depreciation and tax. This represents one full year of operation at the New York plant on board six months on plaster and six months operation of the Michigan plant on both a board and plaster. The company spent and charged to the year's operation $127,242 for advertising—a large part of which was used to break into the market served by the Michigan plant the benefit from which expenditure will be felt this year more than last. The cost of putting the Michigan plant into operation was for the most part absorbed into operating expense.

The report states that it is planned to increase the business done in 1928 by $1,000,000 over the 1927 amount. The company intends to spend from capital approximately $300,000 in New York and Michigan, to increase capacity and lower cost of operation. The plaster capacity at the Michigan plant is to be increased 50%, effective May 1.

It was decided at the recent meeting of the board of directors to provide the funds for plant extensions and improvements and for increase of trade accounts receivable by a permanent loan. This will take the form of a 15-year 6% sinking fund gold bond, $500,000 of which will be disposed of now. The details have not been worked out, but as soon as they are the information will be published. At the same time the board declared the regular quarterly dividend on the preferred stock.

Two new directors have been elected to the board—E. W. G. Borer, proprietor of Borer and Co., Philadelphia, and E. F. Guth, president of Edwin F. Guth Co., St. Louis, Mo. All the other members of the board were re-elected.

NATIONAL GYPSUM CO. BALANCE SHEET, JANUARY 31, 1928

ASSETS

Cash	$ 83,714.46	
Certificate of deposit	433,250.00	
		$ 516,964.46
Notes receivable		30,658.27
Accounts receivable:		
Trade	$ 335,321.90	
Subscriptions	10,900.00	
Railroad claims	3,422.95	
Sundry	8,233.53	
	$357,878.38	
Less allowance for bad accounts	2,309.67	
		355,568.71
Advances for traveling		10,214.09
Inventories		157,586.90
Total current assets		$1,070,992.43
Land and gypsum deposits		$2,930,999.56
Building & equipment	$1,686,271.08	
Railroad & roadways	75,851.32	
Furniture & fixtures	15,294.37	
	$1,777,416.77	
Less reserve for deprn.	71,181.18	
		$1,706,235.59
Total fixed assets		$4,637,235.15
Other assets		61,808.16
Total assets		$5,770,035.74

LIABILITIES

Accounts payable	$ 124,112.84	
Accrued payroll and expenses	18,593.43	
Total current liabilities		$ 142,706.27
Farm mortgage		17,292.00
Pfd. capital stock:		
Issued	$2,483,700.00	
Subscribed	7,400.00	
		2,491,100.00
Surplus and common stock		3,118,937.47
Total liabilities		$5,770,035.74

International Cement to Offer Bonds and Stock

INTERNATIONAL CEMENT CORP. proposes to issue $18,000,000 of 20-year 5% convertible debentures and to offer the common stockholders the right to subscribe to 56,250 shares at $65 a share. Coincident with this financing, the present outstanding 7% cumulative preferred stock amounting to $9,549,800 is to be called at 110. Hayden, Stone and Co. will underwrite the offering of common stock and will purchase the debentures, which will probably be offered for public sale shortly. International Cement is reported to be negotiating for the purchase of two additional plants in the United States which will add substantially to the present productive capacity.

Certain-teed Purchase of Beaver Board Completed

THE purchase of the Beaver Board companies by the Certain-teed Products Corp. was officially consummated as of March 31, according to an anouncement by George M. Brown, president of the latter corporation. This purchase increases the large volume of sales of the Certain-teed corporation by the addition of $17,000,000 of additional business of the Beaver Board companies. Also the physical properties acquired are extensive, including 20 large modern plants.

Under the merger plan, a new preferred stock for both the present first and second preferred issues is issued. Also $13,500,000 of 20-year gold debenture 5½% gold bonds and 93,000 additional shares of common stock are issued.

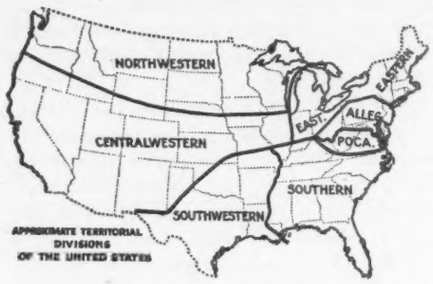
One of the most interesting phases of this purchase as was detailed by Mr. Brown to his stockholders is the potential increased buying and improved earnings made possible by the application of scientific methods of economizing. Mr. Brown states:

"It has always been the history of Certain-teed that it runs its plants and keeps them up to full production 24 hours per day; 300 days a year; and some plants have operated through 36 Sundays out of the 52. Although the present Beaver output amounts to $17,000,000 a year, the total capacity of its plants is around $25,000,000. We expect to be operating on that capacity basis soon.

"By the application of Certain-teed's economical method during our first two weeks of operating Beaver plants, we have done more business than was done by the company in 10 weeks under the former plan."

Low sales costs are a big factor in the Certain-teed method of operating. These costs today run about 12%. The Beaver costs (by contrast) have averaged about 20%. Mr. Brown stated that not only did Certain-teed expect to handle the Beaver sales on the 12% basis, but it was planned to bring these costs, as well as the Certain-teed sales cost, down to 11% or lower.

Traffic and Transportation



Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts), as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended Mar. 10	Limestone Flux Week ended Mar. 17	Sand, Stone and Gravel Week ended Mar. 10	Sand, Stone and Gravel Week ended Mar. 17
Eastern	2,119	2,031	2,493	3,026
Allegheny	2,912	3,038	2,954	3,405
Pocahontas	183	239	582	665
Southern	521	500	9,329	8,804
Northwestern	749	977	2,256	2,485
Central Western	440	442	5,741	6,842
Southwestern	524	438	4,519	4,753
Total	7,448	7,665	27,874	29,980

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1927 AND 1928

District	Limestone Flux 1927 Period to Date Mar. 19	Limestone Flux 1928 Period to Date Mar. 17	Sand, Gravel and Stone 1927 Period to Date Mar. 19	Sand, Gravel and Stone 1928 Period to Date Mar. 17
Eastern	24,120	20,075	20,038	20,592
Allegheny	34,486	30,169	29,910	24,692
Pocahontas	1,932	2,350	3,956	5,239
Southern	5,262	5,534	106,897	92,809
Northwestern	9,564	6,882	25,427	17,858
Central Western	4,444	4,363	56,537	58,585
Southwestern	2,965	4,446	44,259	45,971
Total	82,773	73,819	287,024	265,746

COMPARATIVE TOTAL LOADINGS 1927 AND 1928

	1927	1928
Limestone flux	*82,773*	*73,819*
Sand, stone, gravel	*287,024*	*265,746*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning April 7:

SOUTHERN FREIGHT ASSOCIATION DOCKET

39097. **Crushed stone** from Whitestone, Ga., to Mineral Wells, Texas. It is proposed to establish through rate of 630c per net ton on stone, crushed, carloads, from Whitestone, Ga., to Mineral Wells, Tex., based on Memphis, Tenn., Texarkana, Ark., combination. The through rate to be subject to the minimum weights applicable in connection with the factors to and beyond Memphis-Texarkana.

39128. **Crushed, ground or pulverized stone, marble and slate,** from Tate, Whitestone, Cartersville, Ga., etc., to Pendleton, Ind. It is proposed to establish the same rates on crushed, ground or pulverized stone, marble and slate from Tate, Whitestone, Ga., Kinsey, N. C., Mineral Bluff, Bolivar, Fairmount, Ga., Tellico Plains, Tenn., Marmor, Tenn., Knoxville, Tenn., Brownson, Gantt's Quarry, Ala., and Cartersville, Ga., to Pendleton, Ind., as to Indianapolis and Anderson, Ind.

38740, Amendment 1. **Sand, from Leedy, Miss.,** to Gadsden, Ala., and Columbus, Ga. Submittal No. 38740, included in Docket No. 409, for March 19 hearing, proposes rates on sand, carloads, from Leedy, Miss., to Gadsden, Ala., and Columbus, Ga., the suggested rate to Gadsden being 180c per net ton. This proposition is now amended to provide for rate of 150c per net ton to Gadsden, Ala., made on basis of the scale prescribed by the commission in Docket 17517. It is also proposed to amend the description and carload minimum weight in connection with the proposed rates to read as follows: "Sand (not molding sand), minimum 90% of the marked capacity of car, except when cars are loaded to their visible capacity, in which case the actual weight shall apply, carloads."

38904, Amendment 2. **Crushed stone** from Whitestone and Tate, Ga., to San Antonio, Tex. Submittal No. 38904, as amended, included in Docket No. 411, for April 2 hearing, proposes rate of 680c per net ton on crushed stone, carloads, from Whitestone and Tate, Ga., to San Antonio, Tex., based on Memphis-Shreveport combination. It is now proposed to amend this proposition to suggest rate of 595c per net ton from and to points in question, based on Vicksburg-Shreveport combination, the through rate to be subject to the minimum weights applicable in connection with the factors to and beyond Vicksburg-Shreveport.

Note 1—Minimum weight marked capacity of car.
Note 2—Minimum weight 90% of marked capacity of car.
Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

39203. **Ground limestone** from southern producing points to points in southern territory. It is proposed to establish less than carload rates on agricultural ground limestone, in bags, from producing points in Southern Freight Association territory on the N. C. & St. L. Ry. and other lines to points in southern territory, the same as applies on fertilizer, less than carloads, in lieu of the present fifth class rates.

39223. **Lime, fluxing,** from Knoxville, Tenn., group to Middletown, Ohio. Present rate, 500c per net ton. Proposed rates on lime, fluxing, carloads, minimum weight 60,000 lb., from Concord, Knoxville, Luttrell, Marble City, River Front Extension and South Knoxville Extension, Tenn., to Middletown, Ohio, 386c per net ton. Proposed in order to enable shippers at the origins mentioned to compete with shippers of limestone from Indiana and Ohio kilns.

39227. **Sand, gravel, crushed stone,** etc., from High Bridge and Tyrone, Ky., to Salt Lick, Ky. Present rate, 165c per net ton (combination). Proposed rate on sand, gravel, crushed stone, slag, rubble stone, broken stone and chert, in straight or mixed carloads (See Note 3), from and to points mentioned, 125c per net ton.

39229. **Ground or pulverized limestone** or marl from N. & W. Ry. shipping points to Virginia and Carolina Southern R. R. stations. Lowest combination rates now applicable, and it is proposed to establish through rates on ground or pulverized limestone or marl, carloads, minimum weight 67,000 lb., from shipping points on the Norfolk & Western Ry. to Virginia and Carolina Southern R. R. stations. Statement of the proposed rates will be furnished upon request.

39097, Amendment 1. **Crushed stone,** from Whitestone and Tate, Ga., to Mineral Wells, Tex. Submittal 39097, included in Docket 412, for April 9 hearing, proposes establishment of through rate of 630c per net ton on stone, crushed, carloads, from Whitestone, Ga., to Mineral Wells, Tex., based on Memphis-Texarkana combination. This proposition is now amended to suggest through rate of 555c per net ton on crushed stone, carloads, from both Whitestone and Tate, Ga., to Mineral Wells, Tex., based on Vicksburg-Shreveport combination. The suggested rate to be subject to minimum weights applicable in connection with the factors to and beyond the base points.

SOUTHWESTERN FREIGHT BUREAU DOCKET

14496. **Stone, crushed,** from Whitestone, Ga., to San Antonio, Tex. To establish a rate of $6.80 per ton of 2000 lb. on crushed stone, carloads, from Whitestone, Ga., to San Antonio, Tex. It is proposed to establish through rate of $6.80 per ton of 2000 lb. on crushed stone from Whitestone, Ga., to San Antonio, Tex., which reflects Memphis, Tenn.-Shreveport combinations, with routing restrictions, and thus place the New Orleans gateway on a parity with Memphis, Tenn.

14534. **Sand and gravel,** from points in Texas to points in Oklahoma. To establish the following distance scale of rates on sand and gravel, carloads (See Note 3), but not less than 50,000 lb., for application from F. W. & D. C. Ry. stations, Cliffside to Murdo, Tex., inclusive, to C. R. I. & P. Ry. stations in western Oklahoma:

	Rate		Rate
150 mi. & less	9	210 mi. & over 200	10
160 mi. & over 150	9	220 mi. & over 210	11
170 mi. & over 160	10	230 mi. & over 220	11
180 mi. & over 170	10	240 mi. & over 230	11
190 mi. & over 180	10	250 mi. & over 240	11
200 mi. & over 190	10		

Shippers point out that the only basis available at the present time is Class E rates and that these rates are prohibitive.

14559. **Agricultural limestone,** from Valmeyer, Ill., to points in Missouri. To establish a rate of $1.60 per ton of 2000 lb. to Bagnell and Versailles, Mo., and a rate of $1.70 per ton of 2000 lb. to Warsaw, Mo., on agricultural limestone, carloads (See Note 3), but not less than 60,000 lb., from Valmeyer, Ill. In order that the producers at Valmeyer, Ill., may compete with the Krause, Ill., producers, as well as the Missouri shippers, they contend that it will be necessary to publish rates on the same basis as those currently carried from Krause, Ill.

14576. **Sand and gravel,** etc., from points in Missouri and Kansas to Memphis, Tenn., and other Mississippi River crossings. To revise rates on sand, gravel, crushed stone, rubble stone, broken stone, slag and chert, carloads (See Note 3), from points in Missouri and Kansas to Memphis, Tenn., and other Mississippi River crossings so that they will be no lower than the scale prescribed in I. C. C. Docket 17517. The basis suggested has been provided intra-territorially in Mississippi and Louisiana and also for interstate application, and the southern lines request that southwestern lines give consideration to rates from Missouri and Arkansas points to Lower Mississippi River crossings.

14596. **Crushed stone,** from Whitestone, Ga., to Mineral Wells, Tex. To establish a rate of $6.30 per ton of 2000 lb. on crushed stone, carloads, from Whitestone, Ga., to Mineral Wells, Tex. The proposed rate, it is stated, is based on combination of locals on Memphis, Tenn., and Shreveport, La.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

14225. **Molding sand,** carloads (See Note 3), from Elnora, Mechanicsville, Reynolds, Schaghticoke, Schuylerville, Scotia, Saratago Springs, Stillwater, Wayville and Ushers, N. Y., to Montreal, Que., $3.02 per net ton via Wells River, Vt., and C. P. Ry. Reason—To establish same rates from shipping points on the B. & M. R. R. as now effective from shipping points on the D. & H. Co. in the same vicinity.

14227. **Stone, broken or crushed,** in bulk in gondola or other open top cars, carloads (See Note 2), from Branford (Pine Orchard Quarry), Rocky Hill and East Wallingford (Reed's Gap Quarry), Conn., to Franklin and Bellingham Jct., Mass., $1 per net ton (to expire with November 30, 1928, unless sooner canceled, changed or extended). Reason—To provide a rate that will compete with local stone.

14228. **Common sand** (not molding, fire, filter or blasting sand), **gravel and sand** (run of bank or screened or crushed), carloads (See Note 3), from East Weare, N. H., to stations on Central Vermont Ry. and Rutland R. R., same basis of commodity rates as on screened gravel. (Exhibit showing detail of proposed rates will be furnished on request.) Reason—To establish commodity rates comparable with those now effective for similar distances.

14238. **Stone, broken or crushed,** in open cars,

in bulk, carloads (See Note 2), from Westfield, Mass., to Danbury, Conn., and State Line, N. Y., $1.20; to Brewster and Bangall, N. Y., $1.25; to Arlington Siding, Clove Branch Jct., Hopewell, Fishkill Plains, N. Y., $1.35; to Beacon and Didell, N. Y., $1.40 per net ton. Reason—To withdraw rates that were published to meet competitive rates which have now been canceled.

CENTRAL FREIGHT ASSOCIATION DOCKET

17934. To establish on **gravel and sand**, carloads, Massillon, Ohio, to Hopedale, Ohio, rate of $1 per net ton. Route—Via P. R. R., Alliance, and New York Central R. R. Present rate, 13½c.

17935. To establish on **gravel and sand**, other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding, loam, molding or silica, carloads, Brilliant, Ohio, to Steubenpike, and North Star, Penn., rate of 90c per net ton. Present rate, 13c.

17936. To establish on **gravel and sand**, carloads, East Liverpool, Ohio, to Mineral Ridge, Ohio, rate of 90c per net ton. Present rate, 13c.

17937. To revise rates on **sand (bank) and gravel**, carloads, Millersburg, Ohio, to points in Ohio, viz. (present and proposed rates):

To	Prop. rate A	Prop. rate B	Pres. rate
Girard, Ohio	100	115	90
Niles, Ohio	100	115	90
Warren, Ohio	100	115	90
Alliance, Ohio	90	104	80

A—When in open cars. B—When in box cars.

17938. To establish on **sand**, carloads, North Manchester, Ind., to Chicago, Ill., rate of 90c per net ton. Present rate, sixth class.

17941. To establish on **sand and gravel**, carloads, Cincinnati, Ohio, to Hillsboro, Ohio, rate of $1.10 per net ton. Present rate, $1.20 per net ton. **Sand**, all kinds, carloads, from Delhi, Ohio, to Hillsboro, Ohio. Proposed rate $1.10 per net ton; present rate, $1.20 per net ton.

17968. To establish on **stone dust**, carloads, Piqua, Ohio, to points in Indiana, rates as shown below, per net ton:

Destinations	Prop.	Pres.
Columbia City	$1.96	$2.27
Rochester	1.96	*3.60
Shelbyville	1.39	*3.20
Warsaw	1.96	2.27

*Sixth class.

17970. To establish on **crushed stone**, carloads, from Monon, Ind., to points in Indiana on the Pennsylvania and B. & O. roads following rates in cents per ton of 2000 lb.

From Monon, Ind.

To (Pennsylvania R. R. stations):

	Pres.	Prop.		Pres.	Prop.
Auburn	.....	125	Huntertown	125	125
Auburn Jct.	.....	125	Wallen	125	125
Cedar	.....	125	Ft. Wayne	125	125
La Otto	120	125			

To (B. & O. R. R. stations):

	Pres.	Prop.		Pres.	Prop.
Napanee	127	120	Albion	138	120
Milford Jct.	127	120	Avilla	138	125
Syracuse	138	120	Garrett	138	125
Wawasee	138	120	Auburn	138	125
Cromwell	138	120	St. Joe	138	125
Kimmell	138	120			

17972. To establish on **sand and gravel**, carloads, Allison Branch, Ill., to points in Indiana, rates as shown below. Present and proposed rates (in cents per net ton) from Allison Branch, Ill.:

To	Proposed rate (A)	Proposed rate (B)	Present rate (A)	Present rate (B)
Little	113	100	113	102
Massey	113	100	113	102
Oakland City	113	100	113	102
Gudgel	113	100	*270	*270
Somerville	113	100	*270	*270
Mackey	113	100	*270	*270
Buckskin	113	100	*270	*270
Rosebud	113	100	*270	*270
Elberfeld	113	100	*270	*270

(A) Sand, viz.: Blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica.

(B) Gravel, sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing loam, molding and silica.

*Sixth class rate, per Agent Jones' I. C. C. No. 1460.

17973. To establish on **fluxing stone**, carloads, Marbleville, Ohio, to Meadville, Penn., rate of $1.66 per gross ton. Present rate—No through rate in effect.

17974. To establish on **crushed stone**, carloads, Carey and McVitty's, Ohio, to Detroit, Mich., rate of 95c per net ton. No switching to be absorbed. Route—Via C. C. C. & St. L. Ry., Toledo, Ohio, and N. Y. C. R. R. Present rate, sixth class.

18058. To establish on **refuse sand**, carloads, Shawnee, Ohio, to Taylor, Ohio, rate of 70 cents per net ton. Present rate, 13½c.

18059. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel**, carloads, Columbus, Ind., to Aurora, Ind., rate of $1.05 per net ton. Present rate, $1.16 per net ton.

18060. To establish on **gravel and sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), carloads, Richmond, Ind., to C. C. C. & St. L. Ry. stations in Indiana, rates as shown below:

To	Prop.	Pres.	To	Prop.	Pres.
Bennetts	$0.85	$2.70	Ashby	$0.95	$2.70
Brookville	.90	2.70	New Trent'n	1.00	2.70
Cedar Grove	.95	2.70	Harrison	1.00	2.80

18061. To establish on **crushed stone**, carloads, Ingalls, Ind., to Veedersburg, Rynear, Hillsborough, Range Road, Waynetown, Wesley and Tile Siding, Ind., rate of 88c per net ton. Present rate, $1.01 per net ton.

18063. To establish on **sand, blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica**, carloads, Utica, Penn., to Akron, Ohio, rate of $1.51 per net ton. Present rate, 17c.

18064. To establish on **sand (lake) and gravel**, carloads, Lorain, Ohio, to Millersburg and New London, Ohio, rates as shown below:

To	Proposed rate (A)	Proposed rate (B)	Present rate
Millersburg, Ohio	100	115	15.0
New London, Ohio	90	104	11.5

In cents per 2000 lb.

(A) When in open cars. (B) When in box cars.

18065. To establish on **sand**, viz., **blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica**, carloads, Campbell's, Centreton and *Seelyville, Ind., to points in Michigan.

*Only three destinations involved from this point. Present and proposed rates, as shown:

Campbell and Centreton, Ind.

To (Mich.)	Prop.	Pres.	To (Mich.)	Prop.	Pres.
Adrian	252	265	Kalamazoo	252	265
Albion	252	265	Lansing	252	315
Allegan	252	315	Lapeer	265	378
Alma	265	428	Ludington	382	*
Ann Arbor	252	378	Manistee	382	454
Battle Creek	252	265	Marshall	252	265
Bay City	265	378	Midland	292	454
Big Rapids	382	428	Milan	252	265
Buchanan	227	265	Monroe	252	265
Cadillac	382	428	Mt. Clemens	265	378
Charlotte	252	315	Muskegon	252	315
Cheboygan	442	*	Northville	265	378
Coldwater	252	265	Owosso	265	378
Detroit	252	265	Plainwell	252	315
Dowagiac	252	265	Petoskey	442	*
East Jordan	442	*	Plymouth	252	315
Fenton	265	378	Pontiac	252	378
Flint	265	378	Port Huron	265	378
Grand Haven	252	315	Portland	265	428
Grand Ledge	252	315	Richmond	265	378
Gr. Rapids	252	315	Rochester	265	378
Greenville	265	315	Romeo	265	378
Hartford	252	315	Saginaw	265	378
Hastings	252	315	St. Claire	265	378
Hillsdale	252	265	South Haven	252	*
Holland	252	315	Sturgis	252	265
Holly	265	378	Traverse City	442	*
Howell	252	315	Tecumseh	252	265
Hudson	252	265	Three Rivers	252	265
Imlay City	265	378	Vassar	265	378
Ionia	265	378	Wyandotte	252	265
Jackson	252	265	Ypsilanti	252	265

Seelyville, Ind.

To (Mich.)	Prop.	Pres.	To (Mich.)	Prop.	Pres.
Grand Haven	252	315	Tecumseh	252	214
Muskegon	252	315			

*Classification basis.

18066. To established on **crushed stone**, carloads, Greencastle, Ind., to Advance, Ind., rate of 80c per 2000 lb. Present rate, 97c per 2000 lb.

18067. To establish on **sand** (except blast, core, engine, filter or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel**, carloads, Wolcottville, Ind., to Fayette, Ohio, rate of 88c per net ton. Route—Wabash Ry., Franklin, Ohio, T. & W. R. R. Present rate, 13.5c.

18072. To establish on **crushed stone, agricultural limestone and agricultural limestone screenings**, carloads, Kenton, Ohio, to Akron, Ohio, rate of 80c and to Kent and Ravenna, Ohio, 90c per net ton. Present rate, 90c to Akron, and 100c per net ton to Kent and Ravenna, Ohio.

18074. To establish on **sand and gravel**, carloads, Marion, Ohio, to Bucyrus, Ohio, rate of 60c per net ton. Present rate, 70c per net ton.

18093. To establish on **sand**, viz.: **Blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica**, carloads, from Dillon, Fair Oaks, Philo, Sonora and Zanesville, Ohio, to Wheeling, W. Va. Rate of 140c per net ton. Present rate, 176c per net ton.

18094. To establish on **crushed stone**, carloads, Thrifton, Ohio, to Hamilton, Ohio. Rate of 100c per net ton. Present rate, 14½c.

18095. To establish on **crushed stone**, carloads, Ingalls, Ind., to Decatur, Ind. (N. Y. C. & St. L. Ry.). Rate of $1.13 per net ton. Present rate, $1.26 per net ton.

17910. To estabflish on **crushed stone**, in bulk, in open top cars only, carloads, Thornton, Ill., to Lakeville, Wyatt and Wakarusa, Ind., rates as shown below. Present and proposed rates in cents per net ton:

From	Pres.	Prop.
Thornton to Lakeville, Ind.	115	105
Thornton to Wyatt, Ind.	120	110
Thornton to Wakarusa, Ind.	120	110

Route—B. & O. C. T., Wabash.

17925. To establish on **sand and gravel**, carloads, Burr Oak, Ind., to South Gary, Ind., rate of 50c per net ton. Present rate, 70c per net ton.

TRUNK LINE ASSOCIATION DOCKET

18225. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 3), from Lewes, Del., to Worton, Md., $1.25 per ton of 2000 lb. Reason—Proposed rate is comparable with rates from Wilmington, Del., to Delmar, Laurel, Dagsboro, Del., Hurlock, Md., as per P. R. R. G. O. I. C. C. No. 14212.

18241. (A) **Sand** (other than blast, engine, foundry, glass, molding or silica) **and gravel**, carloads; (B) **sand, blast, engine, foundry, glass, molding and silica**, carloads (See Note 2), from Greer, Cascade and Sturgisson, W. Va., to Cumberland, Md., (A) $1.60, (B) $1.80, and to Cheat Haven, Penn., (A) 90c, (B) $1.20 per ton of 2000 lb. Reason—Proposed rates are fairly comparable with rates from Cascade, Greer, Sturgisson, W. Va., to Sago, Cornwallis, W. Va., Central Junction, Montana, Fairmont, W. Va., and from Berkeley Springs, W. Va., to MacDonaldton, Berlin, Penn., and Martinsburg, W. Va., as per B. & O. R. R. Tariff F. T. 1922, and I. C. C. 21051 and 21120.

17585, Sup. 2. **Lime**, carloads, minimum weight 40,000 lb., and **ground limestone**, carloads, minimum weight 50,000 lb., to Ancram, N. Y., from Bellefonte, Pleasant Gap, Penn., lime 25c, limestone 24½c, and from Devault, Penn., lime 22½c and limestone 22c per 100 lb.

18243. **Stone, broken or crushed**, carloads (See Note 3), from Green Island, Watervliet and Troy, N. Y., to Williamsport, Penn., $3.50 per ton of 2000 lb. Reason—Proposed rate is fairly comparable with rates on like commodities from Crown Point, N. Y., to Williamsport, Penn.

17559, Sup. 1. **Agricultural, land, chemical, gas or glass lime**, carloads, minimum weight 30,000 lb., also **ground limestone**, minimum weight 50,000 lb., from Frederick-Martinsburg district to Vineland and Millville, N. J., 15½c per 100 lb.

18257. **Stone, natural** (other than bituminous asphalt rock), **crushed**, N. O. I. B. N. in Official Classification (See Note 2), from White Haven; White Haven Quarry Co. (west of White Haven), General Crushed Stone Co. (west of White Haven), Penn., to Cresco to Gouldsboro, Penn., inclusive, $1.35 per ton of 2000 lb. Reason—The proposed rates are comparable with rates from Bethlehem to Gouldsboro, Penn.

18269. **Sand** (other than blast, engine, foundry, etc.) **and gravel**, carloads (See Note 2), from Wadsworth and Maxwells, N. Y., to Mayville, N. Y., $1.60 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates from Maxwells to Coopers, Cuba and Salamanca, N. Y.

18282. **Limestone, ground or pulverized, and limestone dust**, carloads, minimum weight 50,000 lb., from Jamesville, N. Y.

To—	Rates in cents per 2000 lb.
Coopers to Avoca, N. Y., incl.	170
Wallace to Dansville, N. Y., incl.	170
Groveland to North Darien, N. Y., incl.	200
Fargo to Black Rock, N. Y., incl.	200

Reason—Proposed rates compare favorably with rates from Lowman to Binghamton, N. Y., inclusive, etc.

18284. (A) **Sand** (other than blast, engine, foundry, glass, molding or silica) **and gravel**, carloads; (B) **sand, blast, engine, foundry, glass, molding or silica**, carloads (See Note 2), from Almond, N. Y., to Carrollton, N. Y., inclusive, and Killbuck, N. Y., to Erie R. R. lines west stations: Water Valley, Redhouse, Jamestown, N. Y., Corry, Meadville, Franklin, Reno, Oil City, New Castle, Penn., and various, rates ranging from 83c to $2.05 per ton of 2000 lb., and it is proposed at the same time to cancel rates from Almond, N. Y., to Carrollton, N. Y., inclusive, and Killbuck, N. Y., to stations West Salamanca to Dayton, N. Y., inclusive., classification basis to apply. Reason—Present rates conflict in some instances and create fourth section departures and it is the purpose of this proposal to clarify this situation.

18292. **Broken stone,** carloads (See Note 2), from Green Lane, Penn., to Philadelphia, Penn., $1.40 per ton of 2000 lb. Reason—The proposed rates compare favorably with rates now in force from Seisholtzville and Trap Rock, Penn., to Allentown, Penn.

18295. **Broken stone,** carloads (See Note 2), from Texas, Md., to Ocean City, Md., $2.05 per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force to Snow Hill, Scarboro, Girdletree and Hershey, Md.

18296. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Lewes, Del., to Greenwood, Del., 95c per ton of 2000 lb. Reason—Proposed rate compares favorably with rates on like commodity for like distances, services and conditions.

18306. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Texas, Md., to Harrisburg, Penn., $1.05 per ton of 2000 lb. Reason—Proposed rate is comparable with rate now in force from North East, Charlestown, Bacon Hill and Principio, Md.

18308. **Crushed stone and screenings,** carloads (See Note 2), from Rochester, N. Y., to Erie R. R. stations: White Mills, Lanesboro, Lawrenceville, Tioga, Hoytville, Mt. Jewett, Brockport, Penn., Narrowsburg, Binghamton, Wellsburg, Elmira, Watkins, Horseheads, Canisteo, Wayland, Avon, Mt. Morris, LeRoy, Dalton, Linden, Depew, Hornell, Irvine Mills, Salamanca, Hamburg, N. Y., and various, rates ranging from 85c to $2.25 per ton of 2000 lb. Reason—Proposed rates compare favorably with rates on like commodities from Rochester, N. Y., to various stations on the W. S. R. R. for like distances, services and conditions.

18313. **Crushed stone,** carloads (See Note 2), from Bound Brook and Elizabethport, N. J., to Eatonville, N. J., 90c per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force to Deal Beach, N. J.

18317. **Sand and gravel** (other than blast, engine, glass, molding or foundry), carloads, minimum weight 100,000 lb., from Pasadena, Md., to Westminster, Md., $1.10 per ton of 2000 lb. Reason—Proposed rates compare favorably with rates from Bragers, Md., to York, Penn., and Union Bridge, Md.

18324. **Flint pebbles,** carloads (See Note 2), from New York, N. Y., to Manumuskin, N. J., $3.50 per ton of 2000 lb. Reason—Proposed rate is comparable with rate from New York, N. Y., to South Vineland, N. J., and from Menantico, N. J., to New York, N. Y.

18335. **Stone, crushed, screenings and tailings,** carloads (See Note 2), from LeRoy, N. Y., to Gouldsboro, Penn., $2.05 per ton of 2000 lb. Reason—Proposed rates compare favorably with other rates on sand and crushed stone from and to points in the same general territory.

18342. **Unburned ground limestone,** carloads, minimum weight 50,000 lb., from Patterson, N. Y. Rates in cents per 2000 lb.

To New York points.

Pawling	75	Amensia	91
Wingdale	75	Sharon	100
Dover Furnace	83	Colemans	100
Dover Plains	91	Millerton	110
Wassaic	91		

Reason—Proposed rates compare favorably with rates from Dover Plains and Port Morris, N. Y., to points in the same general territory.

18343. **Sand,** other than blast, engine, glass, molding, foundry, silica, silex or quartz, **and gravel,** carloads, from Springville, N. Y., to West Eldred, Penn., $1.25 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates on like commodities for like distances, services and conditions.

18344. **Sand,** other than blast, engine, glass, molding, foundry, silica, silex or quartz, **and gravel,** carloads (See Note 2), from Machias, N. Y., to Westfield, N. Y., $1.10 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates on like commodities from and to points in the same general territory.

18346. **Crushed stone,** carloads (See Note 2), from Lime Crest, N. J., to Buttzville and Belvidere, N. J., 75c per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

18350. **Limestone, ground or pulverized, and limestone dust,** carloads, minimum weight 50,000 lb., from Buffalo, N. Y.

To—	Rates in cents per 2000 lb.
Clarks Summit to Kingsley, Penn.	230
Alford, Penn.	210
Heart Lake and Tiffany, Penn.	230
Montrose, Penn.	230
New Milford Penn.	210
Hallstead, Penn., and Conklin, N. Y.	210

Reason—Proposed rates are comparable with rates now in force from and to points in the same general territory.

18354. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from North East, Charleston, Bacon Hill and Principio, Md. Rates in cents per 2000 lb.:

To Penn. points—

Lewistown	185	Huntingdon	220
Lewisburg	185	Shamokin	160
Sunbury	160	Tyrone	220
Altoona	220		

Reason—Proposed rates are comparable with rates now in force from other sand shipping points for hauls of like distances, services and conditions.

18363. **Sand** (other than blast, engine, foundry, glass, molding or silica) **and gravel,** carloads (See Note 2), from Allegany, Vandalia and Olean, N. Y., to Erie R. R. stations; Addison, Canisteo, Silver Springs, Friendship, Irvine Mills, West Salamanca, Perrysburg, Sheridan, Hamburg, N. Y., Bradford, Brockway, Cramer, Penn., and various, rates ranging from 65c to $1.40 per ton of 2000 lb. Reason—Proposed rates compare favorably with rates on like commodities from and to points in the same general territory as per Erie R. R. I. C. C. 17980 and Agent Wilson's I. C. C. A193.

18364. **Crushed stone,** carloads (See Note 2), from Blue Mont to Texas, Md., 65c per ton of 2000 lb. Reason—Proposed rate is comparable with rates from Blue Mont to Freeland, Md., from Ashland to Mt. Washington, Md., and from Texas to Blue Mont and Melvale, Md.

18365. **Agricultural or land lime,** carloads, minimum weight 30,000 lb., from Berkeley, W. Va., to Westminister, Md., 9½c per 100 lb. Reason—Proposed rates are comparable with rates now in force from Martinsburg, W. Va., and York, Penn., to Westminster, Md.

WESTERN TRUNK LINE DOCKET

2812A. **Sand, lake,** carloads, from Michigan City, Ind., to Minneapolis, Minn., Transfer and St. Paul, Minn. Present—$3.03 per net ton, reflecting full combination of local rates to and from Chicago ($0.63 plus $2.40). Proposed, $2.53 per net ton, arrived at by adding $1.90 to the 63c factor to Chicago, this $1.90 factor north of Chicago representing the present rate on sand from Bay City, Wis., to Chicago, Ill.

2188B. **Stone,** carloads, as described in Item 610, W. T. L. Tariff 79-O, from Mankato, Winona, Twin Cities and other points in Minnesota as shown in the above mentioned item, to eastern destinations shown in same item. Present and proposed rates for a few representative points are as follows:

From Winona, Minn.

To—	Present	Proposed
Albany, N. Y.	47	52
Boston, Mass.	50	55½
New York, N. Y.	48	53½
Philadelphia, Penn.	46	51½
Norfolk, Va.	45	50½
Richmond, Va.	45	50½
Rochester, N. Y.	45½	50½
Syracuse, N. Y.	45½	50½
Utica, N. Y.	44½	49½

ILLINOIS FREIGHT ASSOCIATION DOCKET

2853, Sub. 1. **Sand and gravel,** carloads, from Grayville, Ill., to Trumbull, Ill. Rates per net ton. Present, $1.30; proposed, $1.

3330. **Sand and gravel,** carloads (See Note 2), but not less than 40,000 lb., from Chillicothe, Ill., to Kewanee, Ill. Present, 113c; proposed, 101c.

3822C. **Sand and gravel,** carloads, from Ottawa, Ill. Rates per net ton. Present—None in effect. Proposed—To representative points: Reddick, Ill., 101c; Decatur, Ill., 101c; Fairbury, Ill., 88c; Pontiac, Ill., 88c.

4257C. **Sand, core,** carloads (See Note 3), from Van's Siding, Greenwich, West Kankakee and Kankakee, Ill. Rates in cents per net ton.

To (representative points)—	Present	Proposed
Springfield, Ill.	230	189
St. Louis, Mo.	300	214
Rockford, Ill.	250	139

4360A. **Crushed stone** and crushed slag (See Note 2), but not less than 60,000 lb., from Shawneetown, Ill., to Isles, Curran, Bates, New Berlin, Alexander, Orleans, Arnold, Jacksonville Junction, Ill. Present, $1.39 per net ton; proposed, $1.26 per net ton.

4392. **Crushed limestone,** carloads, from Hannibal, Mo., and White Bear, Mo., to Chicago, Ill. Rates per net ton—Present, 202c; proposed, 173c.

4392, Sub. 1. **Crushed limestone,** carloads, from White Bear, Mo., to Quincy, Ill. Rates per net ton—Proposed, 88c; proposed, 65c.

4392, Sub. 2. **Crushed limestone,** carloads, from White Bear, Mo., to various points in Illinois.

To (representative points)—	Present (100 lb.)	Proposed (net ton)
Carterville	15	$2.10
Murphysboro	15	2.00
Rend City	15	1.80
Zeigler	15	1.90

Western Cement Rate Investigation

THE Western Trunk Line Committee recently asked the I. C. C. to broaden its investigation, No. 20303, on the interstate rates on cement in carloads, so as to include the entire cement rate scale. The commission, however, has denied the application. The inquiry is in regard to rates on cement for hauls of 80 miles or less in the territory wherein the so-called 8182 basis of cement rates prevails. That territory is wider than the Western Trunk Line territory, but includes the latter. The petitions had pointed out that under the proposed investigation the readjustment would certainly be a reduction and that this would work an injustice on the carriers and would be hurtful to their revenues, since there is a large tonnage moving for less than 80 miles.

Proposed Cement Rate Adjustment

IT is proposed by Examiner Harry C. Ames that another remodeling be made in the cement rate adjustment (No. 17854) in Missouri, Kansas and adjacent territory. One of the major recommendations was that the commission find the relationship as between intrastate rates on cement from mills in Missouri, on the one hand, and from designated mills in the Kansas gas belt and Bonner Springs, Kan., on the other hand, to described destination territory in Missouri, unduly preferential of shippers in intrastate commerce and unduly prejudicial and disadvantageous to shippers in interstate commerce, and unjustly discriminatory against interstate commerce. The cases brought by the Iola Cement Mills Traffic Association, Fredonia Portland Cement Co., Kansas Portland Cement Co. and the Lehigh Portland Cement Co. were heard jointly with the Missouri Public Service Commission.

Increase in Freight Rates on Cement Is Suspended

BY an order recently entered in Investigation and Suspension Docket No. 3091, the Interstate Commerce Commission suspended from April 7, 1928, until November 7, 1928, the operation of certain schedules as published in Supplement No. 24 to joint tariff Agent E. B. Boyd's I. C. C. No. A-1556 and Agent F. L. Speiden's I. C. C. No. 889.

The suspended schedules propose to cancel the present proportional commodity rates on cement, carloads, between Kansas City, Mo., Omaha, Neb., and points grouped therewith on the one hand and Cairo and Thebes, Ill., and other Ohio River crossing and Memphis, Tenn., on the other, when destined to or originating at points in southeastern and Carolina territories, and to apply in lieu thereof higher class rates.

Help Keep the Government Out of Business

Rock Products Producer and Manufacturer Should Help Fertilizer Industry Defeat the Present Muscle Shoals Proposition

OPPOSITION to the amendments to the Norris Muscle Shoals resolution (S. J. Res. 40) was expressed on April 9 by the National Fertilizer Association. As amended by the house committee, the association claimed, the resolution is an entirely new measure and is designed to put the government "in the fertilizer business."

The views of the association were expressed in a letter sent to the members of congress under the signature of Charles J. Brand, executive secretary of the association.

"Not only would the government's partaking in such a commercial activity be unfair, discriminatory and destructive to the fertilizer industry," the letter said, "but the creation of this precedent would constitute a threat against every American industry and against every security holder in the country."

Further extracts of Mr. Brand's letter follows:

"Enactment will overthrow a cardinal American principle which encourages development of individual initiative, business leadership and our high standard of living —namely, the principle that the government should not do for the citizen what private enterprise can do equally or more efficiently.

"Many speak glibly of 'cheap fertilizer' —but the industry is today furnishing the farmer the best fertilizer he ever used at the lowest relative price he ever paid.

"If the fertilizer industry were robbing the farmer, exploiting and profiteering on him—a fantastic fairy story that has been repeated so often during the Muscle Shoals debates touching on the need of 'cheap fertilizer' that many uninformed persons have been led actually to believe it—then, under the peculiar conditions surrounding the Muscle Shoals project, it is conceivable that it might be proper for the government to go into the fertilizer business to protect the farmer and ultimately the consumer.

"But the industry has not profiteered. To the contrary, it has deficiteered. Since the farm depression began in 1920, the industry has lost $225,000,000 ($22,000,000 in the 1927 season alone), despite the fact that it is furnishing a product to the farmer that, according to a survey made in 1923 by Dr. Sidney B. Haskell, then director, Massachusetts Experiment Station, returns an average of at least $3 for $1.

* * * * *

"Despite the misconceived notion that production of fertilizer by the government at Muscle Shoals will help the farmer, he eventually would be the loser. Admittedly all the fertilizer American farmers need cannot be made at Muscle Shoals, but the subsidized operation (as will be pointed out later) which is provided in the bill would cripple the industry, thus hindering its service to the farmer and serving to stagnate its present progress, yet utterly failing to set up an adequate substitute.

* * * * *

"Furthermore, net profits from sale of power are to be used to lower the cost and sales price of the fertilizer. Thus the basis for establishing the price of fertilizer ignores a fair rate of interest on a huge investment, postpones another legitimate interest charge, applies profits from the sale of power to reduce selling prices of fertilizers, which is violative of the rules of sound cost accounting, and therefore results in setting up unfair, subsidized competition against private industry, which is already performing a great wealth-creating service at extremely low cost. Only when conditions incident to the war were effective were fertilizer prices relatively higher than farm products.

* * * * *

"This proposal would introduce a new and very large production unit in an industry that for 10 years has been suffering with excess capacity and would create a competitive situation which no industry could withstand. How can private enterprise that must hire its moneys at high cost live in competition with a government operation that pays no interest?

"In view of our freight-rate structure, the huge production apparently planned at Muscle Shoals would drive private manufacturers out of the territory within reach of that enterprise, thus depriving hundreds of citizens of their property without due process of law.

"It violates the whole economic trend in the fertilizer industry, which is toward moderate-sized plants placed somewhat uniformly over consuming territory and strategically at ports to take advantage of low marine freights on the important imported materials, particularly potash salts and nitrogen carriers, and also on domestic phosphate rock.

"The bill provides for selling fertilizers for cash only. The government would get business from farmers who can pay cash or who can borrow elsewhere to pay cash. Thus the farmers who are most in need of help would be discriminated against, and the undesirable credit risks would be thrown entirely upon a weakened industry, which, to cover the greater risks involved, would be forced to add to its prices the higher cost due to bad-debt losses.

"Not only would the government's partaking in such a commercial activity be unfair, discriminatory and destructive to the fertilizer industry, but the creation of this precedent would constitute a threat against every American industry and against every security holder in the country. Certainly enactment of this bill would establish an unsafe, un-American precedent leading this country in the direction of Sovietism and away from Americanism."

Trapped by Stone Slide in Rock Bin

AFTER being buried completely for more than an hour under crushed limerock, Robert Glynn, 21, employed at the Oswego, Ore., plant of the Oregon Portland Cement Co., was rescued by employes who had constructed a bulkhead about him to sustain a part of the pressure of the rock.

According to the *Portland* (Ore.) *Journal*, Glynn with Lloyd Henrici had started to clean one of the bins at the plant when the crushed rock about the walls started to slide down upon them. Henrici managed to escape by a ladder, but Glynn was caught in the slide. A rock loader at the plant saw Glynn's foot protruding at the gate and sounded the alarm. The bin in which Glynn was buried was 25 ft. in diameter and 50 ft. deep.

Wyoming Looks for a Second Cement Plant

A STATEMENT made in Wyoming local papers by John Marzel, state geologist, says that Chicago capital has become interested in the prospect of building of a second plant in Wyoming.

The probable location, according to this statement, is at or near Thermopolis, where raw materials and natural gas for fuel are available. Not only limerock, but gypsum and bentonite are accessible from the site suggested.

The Monolith Midwest Portland Cement Co. plant at Laramie, Wyo., is reported to be practically ready to begin production—and the total population of Wyoming is about 200,000!

Foreign Abstracts and Patent Review

Gypsum Research. The author, Prof. P. P. Budniffok, made tests of the effect of normal and molar acid solutions, their sodium salts, salts of univalent, bivalent and trivalent metals, complex salts and bases on the rate of setting of plaster of paris. The thermal effect was observed.

Sulfuric, nitric and hydrochloric acids, as well as $C_4 H_6 O_6$, are accelerators, whose catalytic effect decreases in the order in which they are named. Citric, acetic, formic, phosphoric, boric and lactic acids are retarders, whose catalytic effect varies in the order named.

Sodium salts were used to show the relation of the effect of the active acid anion in acid, neutral and weakly alkaline mediums. The 23 curves obtained showed that sodium salts of sulfuric, hydrochloric, nitric, hydrobromic, chloric and thiosulfuric acids are beneficial to the setting process and may, therefore, be grouped with the positive catalyzers. The positive properties of the above-named salts decrease with increasing molecular weight. Sodium sulfate forms an exception. Sodium salts of sulfurous, citric, lactic, phosphoric and acetic acids are retarders. The negative effect of carbonic acid is so pronounced that even a 10% solution of the salts of this acid produces no second temperature rise.

The salts of univalent metals are strongly positive catalyzers. Their effect varies as follows: $(NH_4)_2SO_4 = KNO_3 = KCl = K_2SO_4 = (Li)_2SO_4 > NH_4Cl > AgNO_3$.

The salts of bivalent metals are strong accelerators and are grouped as follows: $CdSO_4 > CuSO_4 > ZnSO_4 > MnSO_4 > NiSO_4 > FeSO_4 > MgSO_4 > Co(NO_3)_2$.

The salts of earth alkali metals are grouped separately, as they contain a different acid anion and possess different concentrations. They are: $CaCL_2 > BaCl_2 > SrCl_2$.

The salts of trivalent metals in molar solutions are: $Al_2(SO_4)_3 > Cr_2(SO_4)_3 > Fe_2(SO_4)_3$.

The standard solutions yield a variation: $Fe_2(SO_4)_3 > Cr_2(SO_4)_3 > Al_2(SO_4)_3$.

The catalytic properties of complex salts vary as follows: $K_3Fe(CN)_6 > K_4Fe(CN)_6 > (NH_4)Al(SO_4) > (NH_4)Fe(SO_4)_2$.

The catalytic effect of alkalis is: $KOH > NaOH > LiOH > NH_4OH$.

The hydration of insoluble anhydrite was also studied. It was established that it can be brought about by the presence of alkalis, acids, neutral and acid salts in small amounts. Most rapid hydration is produced in the presence of $NaHSO_4$. The fineness has an important effect; the greater the fineness, the stronger is the effect of the admixture. Acid salts do not require as great a fineness as alkalis or neutral salts. All admixtures which produce hydration of insoluble anhydrite act as catalyzers. The process of setting cannot be explained entirely on the basis of hydration. Undoubtedly a change in crystalline formation takes place in time. —*Zement* (1928), 218-222.

Temperature Rise During the Setting of Portland Cement Containing Calcium Chloride. (1) *Neat cement pastes.* Temperature rise and time from gaging the maximum temperature rise or final set of the pastes, each composed of 300 g. of a portland cement, consisting of silica 22.06, lime 62.90, ferric oxide and alumina 10.38, magnesia 2.20, sulphuric anhydride 1.47, and loss on ignition 0.63; 0-20% calcium chloride with 75% purity and 30% water, have been measured (Table I).

TABLE I

	Per cent of calcium chloride								
	0	1	2	2.5	3	5	7	10	20
Final set (hr.-min.)	13-22	8-30	6-20	5-33	5-24	3-40	2-30	1-18	1-6
Temperature rise (deg. C.)	24.2	40.0	40.5	42.0	41.3	38.1	40.8	50.7	57.5

The maximum strength has been developed with 2.5% calcium chloride. (2) *Mortars with 3% calcium chloride.* Similar results are reported. *Sendai (Japan) Tech. School, Research Reports,* **6,** 1-7, *and Ceramic Abstracts* (1928), **3,** 143.

Reactions Between Solid Silicate Substances. The article by Dr. E. Kordes summarizes the available information concerning reactions taking place between solid substances. It is well known to date that such reactions begin to take place far below the point of fusion. The phenomena are those of diffusion in a solid state and are accompanied by displacement of atoms. The formation of mixed crystals first draw attention to the existence of these reactions.

Technically these phenomena are of utmost importance, as they are intimately related to recrystallization, a process of greatest practical significance in the treatment of metals. Coatings of impurities reduce the extent of these reactions. "Tempering" refers to recrystallization and has a far-reaching effect on the mechanical and other physical properties of metals.

Recrystallization also takes place in inorganic substances within the domain of silicate chemistry. G. Tammann has tried to establish the temperature when recrystallization begins. The following methods are recommended:

1. Mixing: the powdered sample is heated and constantly stirred. As soon as recrystallization sets in, the powder begins to cake and stirring becomes difficult.
2. Metallic substances show increased electric conductivity which thus serves as indication of the beginning of recrystallization.
3. The temperature at which expansion of particles begins may be observed.
4. The temperature of increased solidifying may be observed.

This temperature at which reactions between solid substances begin to take place depends on the point of fusion of the substances. For metals this temperature is approximately 0.33-0.4 of the temperature of fusion; for inorganic salts $T_r = 0.57\ T_f$ and for molecular compounds $T_r = 0.9\ T_f$.

The lowering of the point of fusion of a substance by the addition of another substance is frequently observed. The reactions of two solid substances may be accelerated by raising the temperature. The heat of the reaction must be positive and sufficiently high.

Reactions of interest to silicate chemists are those between quartz and $BaCO_3$ and those of a mixture of quartz, $BaCO_3$ and Na_2CO_3. The former reaction becomes apparent at 700 deg. C. and leads to complete driving off of CO_2 at about 800 deg. C. when heated for longer periods of time. Pure $BaCO_3$ begins to dissociate only at temperatures above 1000-1100 deg. C. The second reaction sets in at about 400-450 deg. C., at which temperature Na_2CO_3 begins to crystallize. *Zement* (1928) 94-98.

Testing of Structural Lime. These instructions, published to promote further discussion, are tentative specifications and the result of revisions of the 1924 specifications in December, 1926, May, 1927, and December, 1927.

I. *General Definition of Lime.* Limes are mortar materials, produced by burning calcium carbonate in its various forms to a point below sintering. According to the extent of crumbling, produced by sprinkling the product with water, their composition and their ability to harden under water, limes are classified as follows:

1. White limes.
2. Grey limes.
3. Hydraulic limes.
4. Cement limes (natural and artificial cement limes).
5. Roman limes (Roman cements).

Article II gives individual definitions of the five groups.

III. *The Commercial Products and Its Properties.* Limes are delivered as follows:

(a) Unslaked lump lime (burned lime, "Branntkalk").

(b) Unslaked pulverized lime.

(c) Slaked lime.

(d) Pulverized slaked lime.

Limes are tested to determine: the yield, fineness, soundness and strength.

IV. *Tests—Yield.*

The yield is to be determined only for unslaked lime, whether as lump or pulverized lime.

White lime: 5 kg. lump lime slaked to a paste, shall have an average yield not less than 12 liters lime paste.

Grey lime: 5 kg. grey lump lime slaked to a powder, shall have an average yield of not less than 12 liters lime powder (measured loose).

Hydraulic lime: 5 kg. hydraulic lump lime slaked to a powder, shall have an average yield not less than 10 liters lime powder (measured loose).

Fineness. The pulverized product shall leave a residue of not more than 10% on the standard No. 30 sieve (900 meshes per sq. cm.; 0.20 mm. clear mesh opening). This residue shall be fine enough to pass the standard No. 10 sieve (100 meshes per sq. cm.; 0.60 mm. clear mesh opening).

Soundness. All properly slaked limes are sound.

In testing unslaked or improperly slaked lime, pats of neat lime are made, measuring about 8 cm. in diameter and 8-10 mm. thick at the center. These are cured in a tin box, whose cover is lined with felt and kept moist. Air curing is followed by immersion in water at room temperature for a period of 10 days. If no cracks or distortions are to be observed, the lime is then pronounced as sound.

The pats are cured in air until they acquire sufficient hydraulic resistance. The latter is determined by placing a pat under water for 24 hours and observing possible deterioration.

Strength. Strength is determined on mortars composed of 1 part by weight lime and 3 parts by weight standard lime sand.

The strengths shall have the following minimum values:

White lime, air cured:

Tension: 2 kg. per sq. cm. at 28 days.

Compression: 6 kg. per sq. cm. at 28 d.

Grey lime, immersed at 21 d.:

Tension: 2 kg. per sq. cm. at 28 d.

Compression: 6 kg. per sq. cm. at 28 d.

Hydraulic lime, immersed after 7 d.:

Tension: 4 kg. per sq. cm. at 28 d.

Compression: 15 kg. per sq. cm. at 28 d.

(a) *Preparation of Lime in Making Standard Mortar.* The lime is slaked as specified above and sifted to specified fineness.

(b) *Making Standard Mortar.* Lime and standard sand are mixed by hand in the proportions of 1:3 by weight for one minute and are then placed in a Steinbrück-Schmelzer mixer for 20 revolutions.

(c) *Making of Specimens.* Standard briquettes and cubes for tension and compression tests respectively are made with 180 gm. and 820 gm. of the standard mortar. The mass is compacted by 150 blows of the Böhme hammer apparatus provided with the Martens clamping device. The excess mortar is struck off and the surface smoothed. The molds are removed from briquettes after half an hour and are removed from cubes after 20 hours.

Air-cured specimens shall be protected from air currents and cured at room temperature. Water-cured specimens shall be immersed with not more than 2 cm. water above the specimens. The water shall be changed every 14 days.

(d) *Method of Test.* The breaking load is taken as the tensile strength of a briquette. The load shall be increased at a rate of 100 gm. per second. The average of five tests shall be designated as the tensile strength.

The breaking load determines the compressive strength. The load shall be increased at a rate of 10 kg. per sq. cm. per minute. The average of five tests shall be designated as the compressive strength of the specimen tested.

Compression shall be applied on the side surfaces of the cubes. *Tonindustrie-Zeitung* (1928) 245-248.

Formation of Calcium Hydrosilicates. A foreword by Hans Kühl forms the introduction to a detailed report of tests made by Fritz Klasse. The tests were limited to the formation of calcium hydrosilicates within a definitely fixed range of temperature and pressure conditions. No attempt was made to investigate the entire system of $CaO \cdot SiO_2 \cdot H_2O$. He proceeded by making a substitution of a well defined sodium silicate with a soluble calcium salt, thus obtaining equally well defined calcium salts of the silicic acid used. When sodium silicates, produced by fusion of corresponding amounts of soda and quartz, are decomposed by means of concentrated acids, one obtains the hydrates forming the basis of the salts. Thus $2SiO_2 \cdot H_2O$ is derived from $Na_2Si_2O_5$, etc. The hydrous solutions of the above-named sodium silicates must contain a definite silica ion. A substitution with calcium salts results in the formation of calcium silicate in accordance with the following:

$$Na_2 \cdot SiO_3 + Ca(NO_3)_2 \rightarrow 2NaNO_3 + CaSiO_3$$

This is the basic reaction used throughout the tests. When it takes place entirely in accordance with the direction indicated, the liquid must give a neutral reaction, provided the silicate formed is insoluble and undergoes no change. However, all calcium hydrosilicates are subject to a greater or lesser extent to hydrolysis, resulting in the formation of $Ca(OH)_2$. The alkalinity of the filtrate thus permits to draw certain conclusions on the nature of the precipitate. Another advantage of a substitution of two salts is that one of the reagents may be present in excess without producing the danger of more Ca-ions entering the reaction, than would be required for the formation of the expected hydrosilicates.

A shaking device, arranged for six bottles, was used. Bottles of 500 cc. capacity were used in the tests, each receiving not more than 360 cc. of the suspension. Thorough agitation of the suspension was thus secured by providing sufficient height of drop during rotation. The purest materials were used throughout.

The author summarizes his conclusions as follows:

The tests, carried out with well defined sodium silicates, used for the formation of corresponding calcium hydrosilicates, with the molecular ratios of $CaO : SiO_2 = 1:2$, 1:1, 2:1, have shown that the intermediate compound, the metasilicate, is the most stable, though it is subject to hydrolysis, like all hydrosilicates.

The compound lower in lime than the meta-hydrosilicate, the expected disilicate, appears to be non-existent; the tendency for lime absorption was observed.

The hydrosilicate with higher lime content, the calcium ortho-hydrosilicate, shows on the contrary a strong tendency for lime liberation, so that a normal ortho-hydrosilicate was not obtained throughout these tests.

The molecular ratios found in the tests, 1.50:1 and 1.76:1, have proven that the molecular ratio 1:1 of a meta-hydrosilicate may be exceeded in the direction of lime, and that all low-lime compounds tend to approach these high-lime ratios when acted upon by strong $Ca(OH)_2$ concentration. The results of tests permit us to assume as possible the existence of a calcium-orthohydrosilicate under the conditions described. A pronounced tendency for the formation of a calcium hydrosilicate with the molecular ratio of 1.5:1, as manifested by strong hydrolysis, caused the author to conclude that the orthosilicate has a di-molecular structure. *Zement* (1928) 2-9, 49-56.

Effects of Mica Additions on the Strength of Cement Pastes and Mortars. Any addition of biotite or muscovite mica to a portland cement paste or mortar causes marked reduction in its tensile strength, the reduction increasing with the amount of mica. *Sendai (Japan) Tech. School,* **5**, 305-309, and *Ceramic Abstracts* (1928), **3**, 140.

Hydration of Ternary Systems $CaO \cdot Al_2O_3 \cdot SiO_2$. Seventy-eight mixtures within the ranges of 0-80% alumina, 0-60% silica, and 15-85% lime were studied and microphotographs taken. *Sendai (Japan) Tech. School, Research Reports,* **6**, 9-22, and *Ceramic Abstracts* (1928), **3**, 143.

Sand-Lime Brick Production and Shipments in March

THE following data are compiled from reports received direct from 24 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is two less than those furnishing statistics for the February estimate published in the March 17 issue. The statistics below may be regarded as representative of the entire industry, the reporting plants having about one-half the production capacity in the United States and Canada.

With the opening up of the spring work, production shows a marked increase over the figures for February, although seven plants still reported no production for the month. Shipments both by rail and truck showed a good increase. Stocks on hand remained practically the same, but the increased demand increased the amount of the unfilled orders considerably.

The following are average prices quoted for sand-lime brick in March:

Average Prices for March

Shipping Point	Plant Price	Delivered
Atlantic City	$13.00	.....
Buffalo, N. Y.	12.25	$16.50
Columbus, Ohio	.....	.....
Dayton, Ohio	12.50	15.50
Detroit, Mich.	13.50	16.00
Detroit, Mich.	13.00	15.50
Detroit, Mich.	12.35	15.50
Flint, Mich.	.....	.....
Grand Rapids, Mich.	.....	.....
Hartford, Conn.	14.00	19.00
Jackson, Mich.	12.25	.....
Madison, Wis.	11.50	.....
Menominee, Mich.	11.00	14.50
Michigan City, Ind.	11.00	.....
Milwaukee, Wis.	10.50	13.00
Minneapolis, Minn.	10 00	12.75
Pontiac, Mich.	12.50	14.50
Rochester, N. Y.	.....	19.75
Saginaw, Mich.	12.00	.....
Sebewaing, Mich.	.....	.....
Sioux Falls, S. D.	.....	15.00
Syracuse, N. Y.	18.00	20.00
Toronto, Canada	13.50	16.00
Winchester, Mass.	.....	16.00

The following statistics are compiled from data received direct from 24 producers of sand-lime brick in the United States and Canada:

Statistics for February and March, 1928

	February	†March
Production	10,920,600	16,286,400
Shipments (rail)	3,737,900	4,037,900
Shipments (trunk)	6,203,500	8,932,600
Stock	16,920,200	15,903,200
Unfilled orders	12,625,000	16,825,000

†Incomplete, two plants not reporting stocks, and six not reporting unfilled orders.

News from Producers

Boise Bros. of Pontiac, Mich., is furnishing brick for the addition to the Eastern Junior high school in Pontiac. The company is also supplying the brick for the new Michigan Bell Telephone building in Pontiac. Boise Bros. are now going ahead with an addition to their plant.

Brick furnished by the Sand Lime Products Co. of Detroit, Mich., was used in the recently completed addition to the Chrysler Motor Co. plant. The building will be used for applying baked enameld finish to motor cars. The company is also to furnish brick for the new Central Woodward Christian church at Josephine and Woodward avenues in Detroit.

Matt Brodie

MATT BRODIE, manager for Asia of the Sullivan Machinery Co., of Chicago, Ill., died on March 25, 1928 following an emergency operation for appendicitis about March 1. He was apparently on the way to recovery, where pneumonia set in, resulting in his death.

Mr. Brodie, a native of St. Paul, Minn., entered the employ of the Sullivan Machinery Co. immediately on graduation from the Massachusetts Institute of Technology in 1902. After becoming manager of the Salt Lake City, Utah, branch office of the company, he was assigned to foreign duty, and was for eight years in Australia, where he organized and conducted the Sydney branch office of the company with great success. In 1916 he was sent to Russia, in direct charge of the company's interests there. After the Russian revolution he returned home and was shortly sent to Japan, where he has been manager of the company's Asiatic business in Japan, China, India, etc., for the past ten years.

Mr. Brodie was a man of great engineering and business ability, of the highest integrity. He commanded the confidence and loyalty of all his associates. He was unmarried.

C. N. Conner, Chief Engineer of American Road Builders' Association

THE AMERICAN ROAD BUILDERS' ASSOCIATION announces that C. N. Conner, of the Highway Research Board, has been retained as chief engineer of the association.

Mr. Conner has had wide experience as a road builder and as a committee worker. He has recently been chairman of the committee on low cost improved roads of the Highway Research Board. He was graduated from Tufts College in 1908. For three years he worked as engineer in railroad construction, and later was assistant engineer with the Bureau of Public Roads in the Philippine Islands. His next position was assistant engineer with the War Department and afterward with the Navy Department. He then became assistant engineer with the Delaware State Highway Department, and later state construction engineer for the North Carolina Highway Commission, where he was head of the testing and research laboratory for a brief period. During 1925 and 1926 he was chief engineer of the Mexican Federal Highway Commission. He is a member of several technical organizations and author of many articles which have appeared in technical publications.

Mr. Conner's work for the present will consist of co-ordinating the activities of the committees of the several divisions and arranging for the committee reports which will constitute the program of the next convention. The County Highway Officials' Division, the Highway Contractors' Division and the City Officials' Division will operate through committees and their reports form the basis of the program for the next convention.

Peerless Quarries, Inc., Makes Plant Improvements

PEERLESS QUARRIES, INC., of Utica, N. Y., has made a number of improvements in its crushing plant at Oriskany Falls and has built a sand plant near Solsville, about two miles from the quarry.

At the crushing plant the principal change has been the substitution of Robins vibrating screens for the rotary sizing screens previously used. The change is reported by A. S. Owens of the company to give more efficient screening with a saving of 35 hp. The rotary scalping screen has been retained.

Screens of the trunnion type have replaced screens of the center shaft type which were originally used for washing the stone. There is a gain in capacity and also an advantage in having the center free for spray pipes.

An Armstrong drill sharpener has been installed at the quarry.

The new sand plant is working a bank about 80 ft. high with a Sauerman dragline. Another dragline will be used to put material into storage piles and later reclaim it. Practically all the product is sand, but there is some pea gravel in parts of it.

The plant has Universal vibrating screens and an Eagle washer for washing and scrubbing the sand.

Record Ohio Quarry Blast

WHAT is said to be the largest quarry blast ever made in Ohio was set off recently at the American Crushed Rock Co.'s quarries at White Sulphur, near Delaware. About 115,000 tons of limestone were broken by a blast of 48,000 lb. of explosive which had been placed in 384 holes drilled from 28 to 30 ft. deep.

Plans for and development of the blast were arranged under the direction of R. N. Van Winkle, general manager, and Leroy Keane, representative of the Hercules Powder Co.—*Columbus* (Ohio) *Dispatch.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

The Future of the Concrete Products Association*

Outline Given of Needs to Meet the New Competition of Other Industries

By D. R. ("Spec") Collins
Vice-President, Concrete Products Association

TREMENDOUS changes are taking place in our industrial life. We are facing a competition that five years ago we would have thought impossible. We must forget destructive internal antagonism and replace it with constructive group endeavor. No longer can the individual rely alone on his own endeavors. He should pool his resources with others in mass activity. The new competition is a competition between industries and not between individuals. Oil, gas and coal are fighting as industries to heat the country. Ice and electrical refrigeration are at grips over the problem of cooling it. In our own line of business there are no less than sixty varieties of building material competing for a share of the contents of the builders pocketbook.

Competition Between Industries

Announce that you are going to build a home—then tabulate the results. From the foundation to the roof you will be besieged with representatives of competitive building materials—lumber against stucco and concrete block, asbestos against cedar shingles, wallboard against plaster, linoleum against oak. And though you will still find much of the old competition of individual against individual, you will find, on close observation that the real competition is between industries. We in the concrete products industry, if we are to maintain the position we have gained in a comparatively few short years of life, must look to the future of our industry as a whole if we are to safeguard our personal interests.

We have at present a tendency to strive after volume, thinking it the only solution to all our ills. But what has brought volume about? Doubtless, the greatest contributing factor is the almost universal recognition of our industry as a stable one and the units that we manufacture as stable, worthwhile products. This has made money available for development of our business. Couple with capital the great strides that have been made in the mechanical end of our business and you have the answer—volume. If we are to have mass production— and the tendency is surely that way, we must have mass consumption to take it up. And so far as I can see our only hope of obtaining mass consumption is through constructive trade association promotion and activity.

How Far Can We Go?

How far we can go in this era of the "new competition" depends to a large extent in our answer to four questions propounded in a recent issue of the magazine "The Nation's Business" by O. H. Cheney. They are as follows:

1. In what ways is my business practice out of line with the best interests of my industry as a whole?

2. In what ways are the prevailing business practices in the industry out of line with its own interests and with the public interest?

3. How and why are the different branches and factors in my industry working against each other?

4. What other industries are now, or will be in the future, in active inter-commodity or inter-industrial competition with my industry?

These questions must be answered fairly and squarely. We must realize that the concrete products industry cannot face competition from the brick, the clay tile, and the lumber industry, unless its own house is in proper order and unless it is producing and distributing as economically as possible and with a minimum of internal friction. The reply to Mr. Cheney's questions could be made in few words—"Effective Trade Co-operation."

Progress Has Been Good

For an industry that a few years ago was actually looked upon with disfavor by the better class of builders, a volume of business of over fifty millions of dollars for 1927 is not so bad. It indicates that we have made progress, that our products are not in disrepute, but in demand. Yet, this progress has been made with very little effort on our part as an industry. I doubt if we would be anywhere near where we are today if it had not been for the foresightedness of the Portland Cement Association and other kindred organizations.

But we have thrown off our swaddling clothes and seem able to stand on our own feet. Whether or not we are going to walk; whether we are going to progress or move forward of our own accord, lies wholly with us. We have been carefully nurtured and clothed. Everything has been given us that would help us on our way. But as a child must at sometime take its place in the world, so must our association take its place as an individual and prepare to fight its own battles. We have come to a time when we must act for ourselves.

The average concrete products manufacturer has a bit of the primitive in him. He believes that business will care for itself. It is indeed a touching faith, but this faith alone will do little to fortify him against

*Paper delivered at Philadelphia, Penn., convention of the Concrete Products Association.

the invasion of some competing industry which will take the very bread and butter out of his mouth. He feels that if he belongs to a trade association that everything will always be all right. That the good old association has officers, committees, by-laws, and an annual meeting is proof enough that things *will* be all right. I wonder how many men here realize the amount of work that it is possible for a real, honest-to-goodness association to do for them if they would but support it in a financial way. To simply heave a sigh of relief as the annual convention ends does not remove the obstacles that are constantly arising to threaten the business.

Co-operation the Vital Factor

The Concrete Products Association CAN be the most vital single factor in safeguarding the prosperity of the concrete products industry—BUT every member must work ceaselessly for and with his fellow members. An industry of the magnitude of ours and with its potential possibilities should engage in research, advertising, standardization, merchandising, education. All these and many other activities of a co-operative nature are essential and powerful weapons necessary in facing the competition of today. The sooner our activities become integrated into the organized activity of the whole industry, the sooner the concrete products industry will be ready to fight constructively in the new competition.

If ever a trade association had the opportunity for worthwhile accomplishment this association has. It is backed by years of experiment and education on the part of related industries and of that great organization, the Portland Cement Association. It is high time that its members responded to its financial needs and placed it in a position to do as splendid work as its competitors in the clay and lumber industries are doing.

Let me quote you from an article by Ralph P. Stoddard, paid secretary of the Common Brick Manufacturers Association. I respect his wisdom. I am doing this because I feel that this association has had many of the same troubles we have and because his reasoning may well be applied to our own association.

Who's Competing Who?

"One of the most pitiable defects of the brick manufacturers—some manufacturers at least—is that they don't even know who their competitor is. They are fighting blindfolded. No where in the United States today is the most active and dangerous competitor of any brick manufacturer *another brick* manufacturer. No sir, that day has passed. There was a time when all the competition was between brick manufacturers. They had a merry time of it. About a thousand survived the long war and about five thousand took the count. Occasionally we meet an old boy who doesn't know that Grant is dead—in fact hadn't heard that he was sick. Up in Canada, one manufacturer wouldn't let me talk to him because I came from the States . . . So it isn't strange that there are brick manufacturers who are still carrying arms against their own enemy.

"If they must fight they should at least stop long enough to find out who to fight. I know of several cities where there are three to six common brick manufacturers fighting each other, while a few cement block manufacturers in the town are selling four times the volume of wall that all the brick manufacturers combined are selling. There are mighty few building jobs started in these United States that do not have a salesman for brick substitutes on the ground looking for business before any material is purchased. How many brick manufacturers call on every contractor and building owner before it's too late to sell brick? I know the answer—you 'tried it once and it didn't do any good.' Sure, 'The builder buys the cheapest thing no matter how rotten it is.'

"But did you tell the builder how you and your association can help him sell the better building for more money? Were you able to sit down with him and figure out exactly the difference in cost between a good brick foundation and a cheap block foundation; between brick houses and frame or shoddy stucco houses?

"I know what's going to happen to you if you don't stop fighting among yourselves and turn, unitedly, against your real competitors, the inferior substitutes of brick of various kinds. These could not get the business they are now attracting if they were confronted with enthusiastic, incessant, walloping competition that marshalled all advantages of brick before the customer.

Organize for Constructive Merchandising

"I do not mean that you should organize to fix prices or follow other questionable or unlawful activities, but organize to do sound constructive merchandising in which you will recognize the fellow who is taking the most business from you is not the other brick manufacturer, but the fellow who is selling substitutes for brick.

"If you want to know what I mean by fighting among yourselves, I'll tell you. Trying to 'kill' an order after another manufacturer already has it. Misrepresenting your neighbor manufacturer's brick. Violating all the rules of good business by giving special terms, or 'long counting,' or 'short billing' an order. Jeopardizing your business by giving unlimited or unwarranted credit.

"Promote your business so that you will have a market that will keep your plant busy the year round. Bring your plants to the highest efficiency so that you can produce brick at lowest cost. Know your costs and sell your product at as low a price as possible consistent with just profit, so that brickwork will become more popular. Support the recognized association of your industry so it may truly represent you offensively and defensively in all matters, contact with the government, and with such inseparable agencies as the engineer, the architect, the mason contractor, the bricklayer, and the institutions training men for these professions and craft.

"Men! You must learn to *sell* even if you have to go to night school to get the fundamentals. Order taking is dead. Complaining doesn't help. Find out what is taking business from you, then go after it with a punch.

"Folks are getting rich selling chewing gum, golf balls, bum cigars, terrible sounding saxophones, canes for people who aren't lame, regalia for secret societies, red neckties and a lot more useless stuff. Don't tell me you can't sell the best and most economical building material in the world to one hundred and ten million folks who are spending six billion dollars a year for building."

Future of Products Lies in a "Working Association"

The future of the Concrete Products Association lies in a working association. This calls for reorganization and a broadening of our endeavors. Four points brought out by F. Stuart Fitzpatrick of Organization Service may well be considered in this reorganization. I will list them.

1. Co-operative activities which seek to increase efficiency and lower cost.
2. Co-operative activities which seek new and enlarged markets.
3. Co-operative activities which seek to make the individual enterprise an informal and intelligent competitor.
4. Co-operative activities which seek to overcome attacks from within or without the industry.

New "Stoneform" Plant for Washington, D. C.

THE STONEFORM CORP., which has been developing and perfecting its fabricated stone building material on a small scale for the last year, has just purchased a two-acre tract on the Baltimore and Ohio railroad at Loughborough, Md., a suburb of Washington, D. C., and will begin immediately on the construction of a $50,000 plant. The capacity will be 4000 sq. ft. per day.

The company's product was first introduced to Washingtonians in the model home erected at the Washington Real Estate Board's Better Homes Exposition. A six-room and garage home, of the same Spanish type material used in this model house, is now being built at Brookmont, Md., for Millard F. Hudson, chief examiner of the Federal Trade Commission.

The new product was developed by William F. Wagner, Washington architect and builder. Other Washington business men interested in the new enterprise are Fred S. Gichner, vice-president, and Frederick R. Barkley, secretary-treasurer.

A Merchandising Plan for Concrete Products Manufacturers

Course for Producers to Feature Distribution of Products

By M. R. Bowers
Promotion Engineer, Portland Cement Association

BETTER MERCHANDISING, to meet competition such as business has never known before, is the topic of conversation being discussed on every hand by the leaders of industry. Pick up any trade publication today, turn through the pages, and what do you find? Article after article discussing the need for more aggressive selling and more effective advertising for developing new markets to take care of the ever-increasing production of goods.

From a situation existing in the earliest days of our country, where the individual manufacturer was supplying the needs of his fellow citizens, who called at his little shop and placed their orders directly with him, business has developed to a state where we find groups of allied industries lined up to do battle with competing groups of other allied industries. Capital and brain power are being drafted into the ranks of opposing forces with but one idea in view —a fight to the finish for a greater share of the consumer's dollar.

In place of the individual manufacturer we now have an association of associations being organized for the purpose of educating the American people to see the value of owning homes and of buying necessary staple commodities instead of an ever-increasing amount of luxuries. The building materials industries will be concentrated in a united drive for the purpose of greatly increasing their share of the consumer's dollar, a share that only amounts to 4% in the present day.

Concrete Products Industry Is a Leader

Among the leaders in the building material field today is the concrete products industry, which, reckoned in years, might be considered one of the younger groups. From an industry practically unknown before the war it has developed to a point where it represents over $100,000,000 in capital investment, producing an equivalent of 355,000,000 concrete block 8x8x16 in. in size in 1927.

This development has taken place through public acceptance of the merit of concrete masonry as a worthy building material and not because of aggressive merchandising practice, for the industry has never practiced merchandising in the sense that it is used by large business today. If an industry can develop to a point where the products industry has at the present time with little or no thought to aggressive selling and advertising, what might be the limits of its progress if it suddenly aroused itself to the value and possibilities of real merchandising?

Schools for Producers

The Portland Cement Association, feeling that the potential market for concrete masonry in the field of building materials has scarcely been touched, has developed a merchandising campaign which it plans to present to concrete products manufacturers by means of sales schools. Manufacturers will be acquainted with the purpose of these schools and where they will be held, well in advance of the date on which they will be given. They will be urged to attend at least one of the schools and to come prepared to discuss their various problems from the first steps in the manufacture of their products to the final step of selling the finished product to the building public.

The great amount of material to be covered will require a full afternoon's time in order to allow sufficient opportunity for discussion of questions that undoubtedly will arise. While the subjects of quality and economical manufacture will be discussed at some length, this will be merely to form a basis for the merchandising section of the program. It is this latter phase of the products industry that has failed to keep pace with the development and expansion of plants in the direction of quality and quantity productions. These schools will be conducted by experts who have made a complete study of manufacturing and merchandising problems as applied to the concrete products industry.

Outline for Course in Merchandising Concrete Products

Registration

Introduction
- ***Progress and Trend of Industry***

QUALITY PRODUCTS
- ***Standard Requirements***
- ***Quality Requirements for Competitive Materials***

ECONOMICAL MANUFACTURE
- ***Capital and Equipment as Factors Influencing Cost***
- ***Fundamentals of Economic Concrete***

AGGRESSIVE SELLING
- ***What Competitive Industries Are Doing***
- ***Can the Products Man Afford a Salesman?***
- ***What the Salesman Should Know***
- ***Developing New Markets***
- ***Advertising***
- ***Direct Mail Campaigns***

Need for Products Salesmen

Products manufacturers will be urged to employ salesmen who should make it their daily business to call on all of the many persons who are actively interested in building. This group includes architects, builders and contractors, masons, plasterers, financial organizations, realtors, and prospective home owners. Where present market conditions do not warrant a manufacturer incurring the expense of employing a salesman, it might be worth while and advisable for two or more manufacturers to hire a salesman between them to aggressively sell their products.

Business men are coming to see more clearly every day the need for more careful consideration of the type and character of the man they hire for a salesman. More harm may be done in a few days or weeks through the speech and actions of an untrained, careless salesman than can be corrected in months of hard work. Remember, this man who is selling your products is your representative, and your firm is directly responsible for what he says and does when

he is calling on the trade. The products manufacturer will not go wrong if he employs a man to sell concrete masonry who possesses an endless amount of enthusiasm, energy, resourcefulnes, poise and tact. These points are essential. Besides this he should have a complete knowledge of both the manufacture and use of the product.

A thorough inspection trip through the plant should be the first step in training a salesman of concrete masonry. He should study the aggregate used in the manufacturing process and learn to know all the advantages of that particular material over other kinds of aggregate. A study of the curing and yarding operations will enable him to put up a convincing argument to the prospect on how these operations result in a superior product. In addition to knowing his own product, a practical knowledge of all competitive goods will be greatly helpful to him in presenting a fair comparison of the advantage of his products over those of a competitor when they are being discussed.

Advertising to Be Discussed

Advertising will also be discussed at these schools from all possible angles. Manufacturers will be shown the value of advertising tie-up with home builders' pages in local newspapers. Direct mail campaigns will be outlined to show products men how they may stimulate greater interest and widen demand for concrete masonry.

The foregoing is only a glimpse of some of the material that will be covered in the concrete masonry sales schools. Every manufacturer should plan to attend the meeting when such a school is held in his community. The time will be well spent and every manufacturer will carry away with him a number of ideas that will be helpful to him in meeting the stiffest sort of competition. An afternoon's time spent in attending one of these sales schools will mean more dollars in the bank account of the manufacturer who puts into practice what he learns at this merchandising session, and without doubt no manufacturer can afford to miss attending one of these meetings.

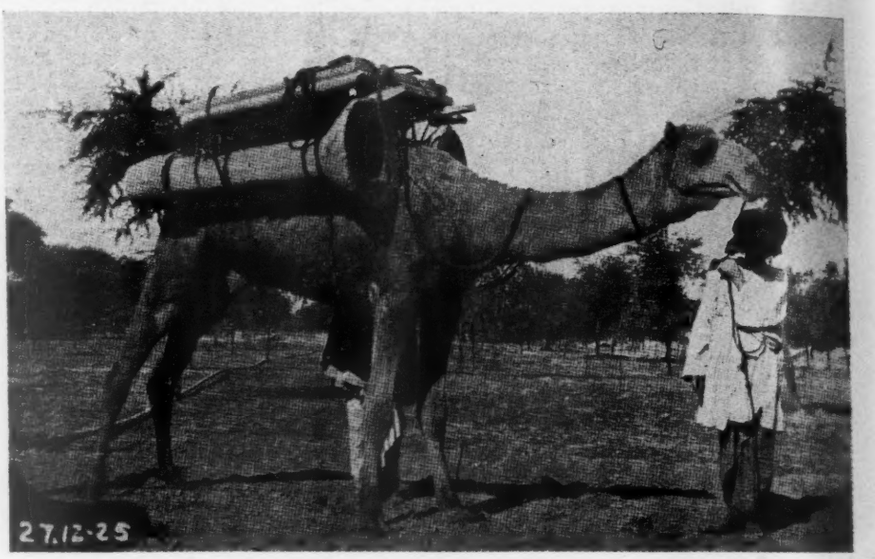
Gem Stone Silica Co. May Build Plant in Seattle

THE GEM STONE SILICA Co., Wenatchee, Wash., may soon build its second crushing and processing plant in Seattle, according to a statement made by C. W. Smith, president, reported in the *Seattle Journal of Commerce*.

The company is building a plant at Wenatchee, Wash., which will begin producing shortly. Crushing equipment and Hum-mer screens are installed and the plant will produce 55 tons in 8 hours. A complete dust-collecting system is included.

The Gem Stone Silica Co. will be one of the largest producers of special stone products in the West when its plans are carried out. It controls 14 quarries producing marbles and ordinary granites, some of them in rare colors. These will be crushed and sold as aggregates for terrazzo and similar work. There are also quarries of zoisite granite, the colors of which are said to be unusual and permanent.

It is reported that orders for 130 carloads of special aggregates were awaiting the completion of the Wenatchee plant.



How cement products are delivered in the Punjab, India

Delivering Cement Products on Camel Back

THE accompanying illustration shows one method of distributing cement products, which, happily, is not yet in vogue in this country. The picture was taken in the Punjab, India, and in comment upon it the *Indian Concrete Journal* says:

"To build the thousands of culverts required in the vast areas developed by recent irrigation projects in the Punjab would prove a very costly item but for the adoption of pre-cast concrete. A very economical and satisfactory practice has been evolved whereby pre-cast sections are manufactured at convenient centers under expert supervision. When required these units are transported on camel back to the various sites where they are easily and quickly erected by labor that has had little training.

"The photograph shows a camel with a load of culvert wing, wall posts and panels."

Cast Stone Manufacturers Organize

FOLLOWING the session of the American Concrete Institute convention at Philadelphia recently, at which concrete stone manufacturing problems were considered, 34 manufacturers of concrete stone held a meeting and formed the Association of Cast Stone Manufacturers, with the following officers:

President, C. Van de Bogart, Economy Concrete Co., New Haven, Conn.

First Vice-President, Wm. P. Eddy, Onondaga Litholite Co., Syracuse, N. Y.

Second Vice-President, M. A. Arnold, Arnold Stone Co., Jacksonville, Fla.

Secretary, Frank M. Brooks, Brooks Art Stone Corp., Pasadena, Calif.

Treasurer, Paul Formigli, Formigli Architectural Stone Co., Philadelphia, Penn.

Temporarily, C. G. Walker, of the Portland Cement Association, 33 West Grand Avenue, Chicago, is the active secretary.

The meeting was called to order by W. D. M. Allan, manager of the Concrete Products Bureau of the Portland Cement Association, who briefly sketched the needs of the concrete stone industry. Mr. Van de Bogart was then made chairman of the meeting. It was voted that the dues should be $200 a year. The president was empowered to appoint a committee on organization and a board of directors. A committee, consisting of W. D. M. Allan, Louis J. Falco and Herman Frannfelder, was appointed to cooperate with a committee to be formed in the American Concrete Institute to draft specifications for cast stone.

The seriousness and purpose of the group of manufacturers toward the upbuilding of the concrete stone industry was evident throughout the meeting.

Big Tooth Found by Gravel Dredge

THE dredge of the Dixon (Ill.) Gravel Co. brought up a big tooth from the bed of the Rock river recently. The dimensions given in a local paper are 7½ in. in length and 5 in. in width.

Such findings ought always to be reported to a state geologist, as they are often of value to solving geological uncertainties.

Charles F. Conn, President, Giant Portland Cement Co., Advocates Cement Tariff

CHARLES F. CONN of Philadelphia, president of the Giant Portland Cement Co., thus concludes a summary of the business situation as it affects the cement industry and the losses that industry has sustained through continuing importation of duty free cement:

"To whatever extent unemployment is serious in this country, industries suffering under inequalities in the existing tariff law are an important factor. Furthermore, improvement will probably await definite assurances from responsible quarters that such tariff inequalities will be corrected by Congress at the earliest practicable date."

As to the present situation of the cement industry, and substantiating his own view, Mr. Conn quotes presidents of two of the largest cement companies in the country to show that this competition has not only resulted in partial losses of important markets but has resulted in price reduction to a point below production costs and has had a serious effect upon the annual earnings of certain companies.

"I realize that there is little hope for a general tariff revision by the present Congress and that fear of unsettling business conditions is an important factor in discouraging tariff revision at this time. However, it may also be remarked in relation to such industries as cement—industries which are either on the free list or whose tariff protection is strikingly inadequate—that continuing uncertainty as to whether a new Congress will offer relief does not contribute either to business or political placidity. Definite assurances at this time of ultimate relief doubtless would aid such industries in formulating future policies.

"When an industry representing more than $600,000,000 of invested capital and normally employing or supporting more than 500,000 people is sick, and at the same time unemployment figures throughout the country are taking an exceptional upward turn, the two factors in the business life of the nation may well be studied together.

Lost Working Days in Cement Industry

"The fact that importations of cement in the last year have accounted for 165,000 lost working days in cement mills alone can hardly be ignored in any consideration of unemployment. As a further result of cement importations, railroad labor, through loss of tonnage in coal, gypsum and the delivery of cement from mill to consumer, also lost 118,306 working days.

"Such importations are made possible by the fact that the cement industry, competing in the labor market and in other production costs with highly protected industries in this country, is on the free list of the tariff law, which in itself is an economic absurdity.

American Money for Foreign Industries

"Might it not be well to inquire whether the situation as to the cement industry is symptomatic and menacing to other industries? In the five weeks prior to March 10, last, exports of gold to Europe through New York showed an increase of 2500%, or approximately $55,000,000, over the corresponding period of 1927, while imports of gold through New York decreased nearly $1,000,000.

"For the same period, while money for new domestic financing increased in 1928 $68,000,000 over 1927, American money for new foreign financing increased $111,000,000.

"For the same periods car loadings in 1928 showed a decrease of several hundred thousand and railroad earnings were off $29,000,000.

"In America we see unemployment, loss of momentum in business, decreased buying, while American dollars are sent abroad to finance new business for the invasion of American markets.

"Thus Gabriel S. Brown, the president of the Alpha Portland Cement Co., in his report to the stockholders as of December 31 last, said:

"'Importation of foreign cement was smaller in 1927 than in preceding years, but exercised an influence on prices out of all proportion to its amount. We can meet foreign competition only by selling our product below cost.'

"F. W. Kelley, president of the North American Cement Corp., in his report for the same year, after pointing out that shipments from his mills kept pace with increased consumption in the territory they serve, that unit costs were reduced more than 6½% as compared with 1926, and that the company benefited from better sales organization and plant improvements, continues:

"'These important gains in volume of business and in unit costs were more than neutralized by reductions in selling prices due largely to foreign cement. As long as there exists in the situation a factor like this which we cannot control and which makes profits dependent upon foreign conditions not available to us, we cannot realize a fair advantage from our efforts.'

"It must be borne in mind that under existing conditions middle western markets are becoming more accessible to the same invasion as the foreign companies continue their present program of expansion. The fact that in 1926 nearly 6,500,000 tons of foreign products passed through ports of the Great Lakes should not be ignored even though it is shown that a large part of such tonnage was of Canadian origin."

American Silica Corp. Files Papers

PAPERS of incorporation, deeds and other documents for the forming of the American Silica Corp., the company which grew from the merger of all the Ottawa, Ill., crude sand plants around, were recently filed at the office of the La Salle county recorder.

A total of 42 documents were in the lot, which included a $1,250,000 bond issue given by the American Silica Corp. to the Central Trust Co. of Chicago. The documents included leases, assignments, releases of leases, bills of sale for the physical workings of the many sand companies which were merged in the big concern and deeds to real estate.

The company's charter shows that the concern was incorporated under the laws of Delaware. The capitalization was listed as $500,000, and 60,000 shares of no par value. It was incorporated to "manufacture, buy, sell, acquire and generally deal in gypsum, lime, cement, cement products, silica, calcareous and siliceous substances, limestone, chalk, alluvial and other clay, whiting, calcined and other plasters and any and all other kindred substances, artificial stone and builder's requisites and conveniences, to purchase, buy, sell, mine, explore and generally deal in and with ores and minerals of every description."—*Ottawa* (Ill.) *Journal.*

Louisiana Producers Consider Gravel Tax Unjust

GRAVEL producers in Louisiana are protesting an unjust interpretation of the Louisiana severance tax applied to gravel lands, as they consider it.

According to the *New Orleans* (La.) *Times*, the National Sand and Gravel Co. of Tongipahoa parish is suing the supervisor of public accounts to prevent him from collecting taxes on a basis of 45c. per yard as the value in the ground.

The law provides for a 2% tax on the value of the product severed from the ground. The company claims that the value of the gravel in the pit is only 5 cents per yd. Sand it holds to be worth only 1 cent. Whatever value the product has beyond this is added by the manufacturing process through which the material goes and the elimination of clay, too fine sand and other waste material.

The present tax amounts to eight mills per ton, as the state figures it. The company seeks to have it reduced to one mill on gravel and one-fifth mill on sand.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.75	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.		1.30	1.10	1.00	1.00	
Frederick, Mo.	.50@ .75	1.35@1.45	1.15@1.25	1.10@1.20	1.05@1.15	1.05@1.10
Ft. Spring, W. Va.	.35	1.30	1.30	1.25	1.20	1.15
Munns, N. Y.	1.00	1.25	1.25	1.25	1.25	
Prospect, N. Y.	1.00	1.40	1.25	1.25	1.25	
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
St. Vincent de Paul, Que. (n)	.80	1.50		.95	.90	
Walford, Penn.			1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.			.50	.50	.50	1.50
Alton, Ill.	1.85		1.85			
Columbia and Krause, Ill.	.90@1.25	.80@1.35	1.00@1.35	.90@1.35	.90@1.35	
Cypress, Ill.	1.00@1.25	1.00@1.25	1.20@1.25	1.20@1.25	1.20@1.25	1.35
Dubuque, Iowa (h)	.80	1.40	1.40	1.40	1.35	1.35
Greencastle, Ind.	1.25	1.10	1.10	1.10	1.00	1.00
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Linwood, Iowa (f)	1.10	1.55	1.55	1.35	1.45	1.45
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.		.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	
Stone City, Iowa	.75		1.10	1.05	1.00	1.00
Thornton, Ill.	.90	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Canada (m)	2.50	3.00	3.00	2.85	2.85	2.85
Valmeyer, Ill. (fluxing limestone)	.90@1.20			1.75		1.75
Waukesha, Wis.		.90	.90	.90	.90	.90
Wisconsin Points	.50		1.00	.90	.90	
Youngstown, Ohio	.70j	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h
SOUTHERN:						
Atlas, Ky.	.50	1.00	1.00	1.00	1.00	1.00
Cartersville, Ga.	1.00	1.65	1.65	1.35	1.15	
Chico, Texas	1.00	1.30	1.25	1.20	1.10	1.05
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	
Graystone, Ala.	Crusher run, screened, $1 per ton					
Kendrick and Santos, Fla.	3½ in. and less, $1 per ton					
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.25	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	1.25	1.25	1.25	1.00	
Rock Hill, St. Louis, Mo.	1.00	1.25	1.00@1.25	.90@1.25	.90@1.25	.90@1.25
Sugar Creek, Mo.	.75	1.00	1.20	1.20	1.20	1.20

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35		1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	
Duluth, Minn.	.90@1.00	2.25	1.75	1.55	1.25	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.65	1.35	1.25	
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.35@1.40	2.00@2.10	1.80@1.90	1.40@1.50	1.40@1.50	
Richmond, Calif.	.75		1.00	1.00	1.00	
Spring Valley, Calif.	.75	1.10	1.10	1.10	1.10	
Springfield, N. J.	1.60	2.10	2.00	1.60	1.60	
Toronto, Canad (m)		5.80	4.05	4.05		
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	
Cayce, S. C.—Granite	.50	2.00	1.80	1.80	1.65	
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	1.00		2.35			
Lithonia, Ga.—Granite	.75a	2.00b	1.75	1.40	1.35	
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	
Middlebrook, Mo.	3.00@3.50		2.00@2.25	2.00@2.25		1.25@3.00
Richmond, Calif.—Quartzite	.75		1.00	1.00	1.00	
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga.			1.30	1.25	1.20	1.20

(a) Sand. (b) to ½ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¼ in., 1.45; 2 in. to ¼ in., 1.35. High calcite fluxing stone, 1.40. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05. (m) Plus .25 per ton for winter delivery. (n) Crusher run for ballast, .80. (p) Carload prices. (q) Crusher run, 1.40; screenings for ¼-in. granolithic finish, 3.00.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$; 90% thru 200 mesh	6.00
Atlas, Ky.—90% thru 100 mesh	2.00
50% thru 100 mesh	1.00
Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh	5.00
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 93½%; $MgCO_3$, 3½%; 50% thru 50 mesh	1.50
Cartersville, Ga.—50% thru 50 mesh	1.50
Pulverized, per ton	2.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Cypress, Ill.—Analysis, 88% $CaCO_3$; 10% $MgCO_3$; 50-90% thru 4 mesh	1.25
50-90% thru 100 mesh	1.35
Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags	3.95
Bulk	2.70
Jamesville, N. Y.—Analysis 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags	4.25
Joliet, Ill.—Analysis, 52% $CaCO_3$; 44% $MgCO_3$; 90% thru 100 mesh	3.50
Knoxville, Tenn.—80% thru 100 mesh; bulk	2.70
Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk	1.75
Marl—Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk	2.25
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton	2.00
Middlebury, Vt.—Analysis 99.05% $CaCO_3$; 90% thru 50 mesh	6.00
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis, $CaCO_3$, 97%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50

Agricultural Limestone

(Crushed)

Atlas, Ky.—90% thru 4 mesh	1.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$; 1%, $MgCO_3$; 90% thru 10 mesh	1.50

(Continued on next page)

Agricultural Limestone

Chico and Bridgeport, Tex. — 50% thru 100 mesh	1.50
Danbury, Conn.; Adams, Ashley Falls and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MaCO_3$; 90% thru 50 mesh, bulk	3.50
100-lb. paper bags	4.75
100-lb. cloth bags	5.25
(All prices less .25, 15 days.)	
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Spring, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 50 mesh	1.00
Kansas City, Mo. — 50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Linwood, Iowa—Analysis, 98% $CaCO_3$, 1.10% or less $MgCO_3$; 100% thru 4 mesh	1.10
50% thru 50 mesh	1.10
100% thru 20 mesh, sacked, sacks extra	9.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Logansport, Ind.—85% thru 10 mesh, 20% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags, 4.50; burlap bags	5.00
Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—90% thru 100 mesh, 4.50: 50% thru 100 mesh	2.35
Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	.90@1.50

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill. — Analysis, 50% $CaCO_3$; 42% $MgCO_3$; 95% thru 100 mesh; paper bags	3.50
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks	4.25
Piqua, Ohio, sacks, 4.50@5.00; bulk	3.00@ 3.50
Rocky Point, Va.—85% thru 200 mesh, bulk	2.25@ 3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Cedarville and S. Vineland, N. J.	*1.75@ 2.25
Estill Springs and Sewanee, Tenn.	1.50
Franklin, Penn.	2.00
Klondike, Mo.	2.00
Massillon, Ohio	3.00
Michigan City, Ind.	.35
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
San Francisco, Calif.	4.00@ 5.00
Silica, Va.	2.00@ 2.50
Ground glass sand, 140 mesh	8.00@12.00
St. Louis, Mo.	2.00
Utica and Ottawa, Ill.	.75@ 1.00
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.75
Dresden, Ohio		1.25
Eau Claire, Wis.	4.25	.65@1.00
Estill Springs and Sewanee, Tenn.	1.35@1.50	1.35@1.50
Ohlton, Ohio	1.75	*1.50
Massillon, Ohio		2.00
Michigan City, Ind.		.30
Montoursville, Penn.		1.25
Ohlton, Ohio	1.75	*1.50
Ottawa, Ill.	1.25	1.25
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50

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Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N.J.	.65	.55	1.00	1.35	1.40	
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05		1.05
Erie, Penn.	.60	1.45			1.40	
Machias Jct., N. Y.	.85	.65	.65		.65	.65
Montoursville, Penn.	1.00	.80	.75	.65	.65	.60
Northern New Jersey	.50	.50	1.25		1.25	
Portland, Me.		1.00	2.25			2.00
Somerset, Penn.		2.00				
Washington, D. C.	.60@ .85	.60@ .85	1.70	1.50	1.30	1.30
CENTRAL:						
Attica, Ind.			All sizes .75@.85			
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.25@ .80	.50@ .70	.10@ .40	.50@ .70	.60@ .80	.60@ .80
Barton, Wis.		.55	.75	.75	.75	.75
Chicago District	1.30*@1.50*‡			1.50*@2.00*‡		.25*
Columbus, Ohio¶		.85	.85	.85	.85	
Des Moines, Iowa		.40		1.50	1.50	1.50
Eau Claire, Chippewa Falls, Wis.	.50	.50	.65		.95	
Elkhart Lake, Wis.	.60	.30	.50	.56	.50	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Grand Haven, Mich.		.60@ .80	.70@ .90	.70@ .90		.70@ .90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio		1.00	1.00		1.00	
Hersey, Mich.		.50		.60	.70	.70
Humboldt, Iowa	.35	.35	1.35	1.35	1.35	1.35
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Mankato, Minn.		.45g		.60@1.25h	.70@1.25	1.25c
Mason City, Iowa		.50	1.25	1.25	1.25	1.25
Mattoon, Ill.			.75@.85 all sizes			
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.65*	.65*	1.75*	1.75*	1.75*	1.75*
St. Louis, Mo.	1.20e	1.45f	1.55a	1.45	1.45	1.45
St. Paul, Minn.	.35	.35		1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.75	.85	.75	.75
Waukesha, Wis.		.45	60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.10	1.10
SOUTHERN:						
Brewster, Fla.			3.00			
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.			River sand and gravel, all sizes, 1.40			
Eustis, Fla.	.45@ .50					
Ft. Worth, Texas	1.09	1.09	1.00	1.25	1.25	1.25
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.10
Macon, Ga.	.50	.50				
New Martinsville, W. Va.	1.10	1.00		1.30	1.10	.90
Roseland, La.	.25	.15	1.25	.85	.45@ .65	
WESTERN:						
Kansas City, Mo.	.70	.70@ .75				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10@ .40	.10@ .40	.50@1.00	.50@1.00	.50@1.00	.50@1.00
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Otay, Calif.		.35@ .50	.60	.60	.60	.60
Phoenix, Ariz.	1.25	1.00	1.50	1.25	1.10	1.00
Pueblo, Colo.	.80	.60		1.20		1.15
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Steilacoom, Wash.	.50	.50	.50	.50	.50	.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Brookhaven, Miss.						.60
Buffalo, N. Y.	1.10	.95		.85		.85
Burnside, Conn.		.75				
Des Moines, Iowa	.60					
Dresdon, Ohio	.60@ .75	.70	.60	.80	.75	.65
Eau Claire, Chippewa Fls., Wis					.65	
Ft. Worth, Texas						.80
Gainesville, Texas						.55
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		.50
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Somerset, Penn.		1.85@2.00		1.50@1.75		
Steilacoom, Wash.	.25					
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.40	.40	.60	.60	.60	.60
York, Penn.	1.10	1.00				

*Cubic yd. ‡Delivered on job by truck. (a) ⅝-in. down. (b) River run. (c) 2½-in. and less. ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Washed and screened river sand. (h) ¾-in. to ¼-in.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.75	2.50	2.75	1.75		4.00	
Beach City, Ohio	1.75@2.00	1.75@2.00		1.75	1.75@2.00		
Dresden, Ohio	1.50@1.75	1.25@1.50	1.50@1.75	1.25			
Eau Claire, Wis.						3.00	
Elco & Tamms, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75		1.75			
Kasota, Minn.							1.00
Kerrs, Ohio	1.10@1.50	1.25@2.00	2.00			2.75@3.00	
Klondike, Mo.				2.00	2.00		2.00
Massillon, Ohio	2.25	2.25		2.25	2.50		
Michigan City, Ind.				.30@ .35			
Montoursville, Penn.				1.35@1.50			
New Lexington, O.	2.25	1.25					
Ohlton, Ohio	1.75	1.75		2.25	1.50	2.00b	1.75b
Ottawa, Ill.	1.25	1.50	1.25	3.25	1.25	3.50	2.00
Red Wing, Minn.(d)					1.50	3.00	1.50
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50@5.00†	3.50@5.00†	3.50@5.00†	
Silica, Va.	Pottery sand, 8.00@12.00						
Utica & Ottawa, Ill.	.40@1.00f	40.@1.00f	.75@1.00	.40@1.00f	.60@1.00f	2.23@3.25	1.00@3.25
Utica, Ill.	.60	.70		.75	1.00		
Warwick, Ohio	1.50*@2.00	1.50*@2.00		1.50*@2.00	1.50*@2.00		
Zanesville, Ohio	2.00	1.50	2.00	2.00	2.00		

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (b) Damp. (c) Shipped from Albany. (d) Filter sand, 3.00. (e) Filter sand, 3.00@4.25. (f) Crude and dry.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Erie and Dubois, Pa.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.25		1.50			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	
Jackson, Ohio	2.05*	1.05*	1.80*	1.30*	1.05*	1.30*	
Toledo, Ohio	1.50	1.35	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.		1.45*		1.45*	1.45*	1.45*	1.45*
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.	2.05*	.80*	1.35*	1.25*	.90*	.90*	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.00
Buffalo, N. Y.		12.00	12.00	12.00			10.00	1.95[4]
Lime Ridge, Penn.							5.00[2]	
West Stockbridge, Mass.	12.00	10.00	5 60					2.00[12]
Williamsport, Penn.			8.50@9.50		7.00	9.00	5.00	
York, Penn., & Oranda, Va.	11.50[7]	8.50@9.50[7]	8.50@9.50[7]	8.50@10.50[7]	8.00	9.25	7.00	1.40[3]
CENTRAL:								
Afton, Mich.							7.80	1.35
Carey, Ohio	11.50	7.50	7.50		9.00		8.00	1.50
Cold Springs, Ohio		8.50	8.50				8.00	
Gibsonburg, Ohio	11.50				9.00	11.00		
Huntington, Ind.	12.50	8.50	8.50		9.00		8.00	
Luckey, Ohio[6]	11.50							
Milltown, Ind.		8.50@10.00		10.00[8]			8.50[22]	1.35[10]
Scioto, Ohio		8.00	8.00	8.50	8.25	.62½	7.50	1.50
Sheboygan, Wis.		10.50					9.50	2.00[4]
Wisconsin points[5]		11.50					9.50	
Woodville, Ohio	11.50	7.50@ 8.00	7.50@ 8.00	12.50	8.00	10.00[9]	9.00	1.50[3]
SOUTHERN:								
El Paso, Texas							7.00	
Frederick, Md.		8.00@9.50	8.00@9.50			9.50[15]	7.00[15]	
Graystone, Ala.	12.50	10.00		12.50		1.40[11]	8.50	1.50
Keystone, Ala.		10.00	8.00	10.00	8.00		8.00	1.50
Knoxville, Tenn.	20.25	8.50	8.50	8.50			7.50	1.35
Ocala, Fla.		10.00	9.00				10.00	1.40
WESTERN:								
Cirtland, N. M.							15.00	
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
Los Angeles, Calif.	16.00		16.00	16.00			16.00	
San Francisco, Calif.	19.50	16.00	13.00	19.50	14.50	.80	14.50	1.85
Tehachapi, Calif.[13]	17.00	15.00	12.00@15.00[14]	17.00	16.00		16.00	2.00
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel. [5] 180 lb. [6] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] In paper bags, including bags. [8] To 11.00. [9] 80-lb. [10] To 1.50. [11] Refuse or air slack, 10.00@12.00. [12] To 3.00. [13] Delivered in Southern California. [14] Per 2 bags of 90 lb. each. [15] To 8.00. [22] To 9.00. [50] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing Sand	Traction
Utica & Ottawa, Ill.	1.00@ 3.25	.75
Zanesville, Ohio		2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	35.00
Blanks (per lb.)	.08
Pencils and steel crayons, gross	1.00@ 2.80
Chatsworth, Ga.:	
Ground talc (150-200 mesh)	6.00@15.00
Pencils and steel crayons, per gross	.85@ 2.40
Chester, Vt.:	
Ground talc (150-200 mesh), paper bags	9.00@ 9.50
Same, burlap bags, bags extra	8.00@ 8.50
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc (for grinding)	5 00
Ground talc (150-200 mesh), bags	12.00
Pencils and steel worker's crayons, per gross	1.00@ 2.50
Emeryville, N. Y.:	
(Double air floated) including bags;	
325 mesh	14.75
200 mesh	13.75
Glendon, N. C.:	
Ground talc (150-200 mesh), bulk	6.00@10.00
Ground talc (150-200 mesh), bags	8.00@14.00
Pencils and steel crayons, gross	1.05@ 2.00
Blanks, .08 per lb.; cubes	50.00
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.00
Ground talc (150-200 mesh), bags	8.50@14.75
Joliet, Ill.:	
Ground talc (150-200 mesh) in bags:	
California white	30.00
Southern white	20.00
Dark	10.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (300-325 mesh), bags	12.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Columbia, Tenn.—B.P.L. 65-70%	3.50@ 4.50
Gordonsburg, Tenn.—B.P.L. 65-70%	3.75@ 4.00
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	8.00@ 9.00

Ground Rock

(2000 lb.)

Centerville, Tenn.—B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72.5%	9.50
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H.—Per ton,	
Mine run	300.00
Clean shop scrap	25.00
Mine scrap	22.50@24.00
Roofing mica	37.50
Punch mica, per lb.	.12
Cut mica—50% from Standard List.	

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt. — English pink, English cream and coral pink	*12.50	*12.50
Brandon grey	*12.50	*12.50
Brighton, Tenn.—Pink marble chips	§3.00	§3.00
Crown Point, N. Y.—Mica spar		9.00@10.00
Easton, Penn.—Green stucco		12.00@18.00
Green granite		14.00@20.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio—Concrete facings and stucco dash		11.00@18.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		4.00@ 5.50
Phillipsburg, N. J.—Royal green granite		15.00@18.00
Randville, Mich.—Crystalite crushed white marble, bulk	4.00	4.00@ 7.00
Rose pink granite, bulk		12.00
Stockton, Calif.—"Natrock" roofing grits		12.00@20.00
Tuckahoe, N. Y.—Tuckahoe white	10.00	
Warren, N. H.		¶7.90@¶8.95
Wauwatosa, Wis.		20.00@32.00
Wellsville, Colo. — Colorado Travertine Stone	15.00	15.00

*Carloads, including bags; L.C.L. 14.50.
†C.L. L.C.L. 16.00.
‡Carloads, including bags; L.C.L. 10.00.
§Bulk, car lots, minimum 30 tons.
¶C.L. ‖L.C.L.

Potash Feldspar

Auburn and Topsham, Me. — Color white, 98% thru 140-mesh	19.00
Buckingham, Ore.—White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white, bulk (crude)	9.00
East Hartford, Conn.—Color, white, 40 mesh to 200 mesh	15.00@28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.18%; Na_2O, 1.65%; SiO_2, 64.65%; Fe_2O_3, .08%; Al_2O_3, 19.20%; Arizona spar, crude, bags, 12.50; bulk	11.50
Pulverized, 95% thru 200 mesh: bags, 19.73@23.50; bulk	18.63@20.00
Pulverized, 20% thru 80 mesh; bags, 17.60; bulk	16.50
"Imperial" feldspar, 200 mesh; bags, 23.50; bulk	22.50
"Riverside" spar, 200 mesh; bags, 17.60@20.00; bulk, in quantity	13.65
20% thru 80 mesh; bags, 17.60@20.00; bulk, in quantity	13.65
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; Si_2O, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk (Bags 15c extra.)	18.00
Tenn. Mills—Color, white; analysis K_2O, 10%; Na_2O_3, 3%; 68% SiO_2; 99½% thru 200 mesh; bulk (Bags, 15c extra)	18.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton, Mich. (Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Chico and Bridgeport, Tex.—Hen	¶9.00
Baby chick, per ton	¶8.00
Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass. (Limestone	‡7.50@*9.00
Easton, Penn.—In bags	8.00
El Paso, Tex.—Per ton	1.00
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—(Feldspar), per ton, including sacks	15.00
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton	10.00
Randville, Mich.—(Marble), bulk	6.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Gypsum), bulk, per ton	10.00
Tuckahoe, N. Y.	8.00
Waukesha, Wis.—(Limestone), per ton	8.00
Wisconsin Points—(Limestone), per ton	15.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	10.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50@13.50
Detroit, Mich.	13.00@16.00*
Farmington, Conn.	13.00
Flint, Mich.	¶11.50@19.00c
Factory jobs, f.o.b. plant, net	13.25
Grand Rapids, Mich.	12.50
Hartford, Conn.	14.00@18.00*
Jackson, Mich.	12.25
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.00@12.00
Lancaster, N. Y.	12.25
Madison, Wis.	12.50a
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	16.00*
Portage, Wis.	16.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50b
San Antonio, Texas	16.00
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
Syracuse, N. Y.	18.00@20.00
Toronto, Canada	13.50@16.00*†
Wilkinson, Fla.	12.00@16.00
Winnipeg, Canada	15.00

*Delivered on job. †5% disc., 10 days. ¶Dealers' price. (a) Less 50c discount per M, 10th of month. (b) Red, $16. (c) Less than 2000, 5% discount, delivered; more than 2000, 10% and 5% discount, delivered.

Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	84¼	3.37
Atlanta, Ga.		2.35
Baltimore, Md.		2.15‡@2.25
Birmingham, Ala.		2.10
Boston, Mass.		2.13@2.23
Buffalo, N. Y.		2.00‡@2.10
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa		2.24
Charleston, S. C.		2.35
Cheyenne, Wyo.	.64	2.56
Chicago, Ill.	.51¼	2.05
Cincinnati, Ohio		2.22
Cleveland, Ohio		2.24
Columbus, Ohio		2.22
Dallas, Texas		2.00
Davenport, Iowa		2.24
Dayton, Ohio		2.24
Denver, Colo.	.63¾	2.55
Des Moines, Iowa		2.05
Detroit, Mich.		1.90
Duluth, Minn.		2.04
Houston, Texas		2.00
Indianapolis, Ind.	.54¼	2.19
Jackson, Miss.		2.10
Jacksonville, Fla.		2.20
Jersey City, N. J.		2.03‡@2.13
Kansas City, Mo.		1.92
Los Angeles, Calif.	.60	2.40
Louisville, Ky.	.55½	2.22
Memphis, Tenn.		2.10
Milwaukee, Wis.		2.20
Minneapolis, Minn.		2.12@2.22
Montreal, Que.		1.36
New Orleans, La.		2.07
New York, N. Y.		1.93‡@2.03
Norfolk, Va.		2.07
Oklahoma City, Okla.		2.46
Omaha, Neb.		2.36
Peoria, Ill.		2.22
Philadelphia, Penn.		2.11‡@2.21
Phoenix, Ariz.		3.26
Pittsburgh, Penn.		2.04
Portland, Colo.		2.80
Portland, Ore.		2.40‡@2.60
Reno, Nev.		2.91
Richmond, Va.		2.24‡@2.34
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.		2.51
Savannah, Ga.		2.30
St. Louis, Mo.		1.95
St. Paul, Minn.		2.12@2.22
Seattle, Wash.		2.50†@2.65
Tampa, Fla.		2.25
Toledo, Ohio		2.20
Topeka, Kan.		2.41
Tulsa, Okla.		2.33
Wheeling, W. Va.		2.12
Winston-Salem, N. C.		2.44

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Albany, N. Y.	.43¾	1.75
Buffington, Ind.		1.80
Chattanooga, Tenn.		2.45*
Concrete, Wash.		2.35
Davenport, Calif.		2.45*
Hannibal, Mo.		1.90
Hudson, N. Y.		1.75
Leeds, Ala.		1.65
Lime and Oswego, Ore.		2.50‡
Mildred, Kan.		2.35
Nazareth, Penn.		2.15
Northampton, Penn.		1.75
Richard City, Tenn.		2.05
Steelton, Minn.		1.85
Toledo, Ohio		2.20
Universal, Penn.		1.80

NOTE—Add 40c per bbl. for bags.
*Includes sacks.
†10c discount, 10 days. ‡10c discount, 15 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	Gauging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	—Plaster Board— ⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lengths 6'-10'. Per M Sq. Ft.
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u					11.70u			
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50			13.50			
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.					14.30o	12.30m		m9.00@11.00o					
Delawanna, N. J.								7.25			13.00	14.00	
Douglas, Ariz.			6.00	14.50	15.00		18.00		30.00				
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50		24.35	20.00			
Gypsum, Ohio	3.00	4.00	6.00	7.00	9.00	9.00	19.00	7.00	24.50	19.00		15.00	25.00
Los Angeles, Calif.			7.50@9.50	11.50y									
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00		20.00	30.00
Portland, Colo.				10.00									
San Francisco, Calif.			9.00	13.40	14.40		15.40						
Seattle, Wash.	6.60	10.00	10.00	13.00									
Sigurd, Utah									21.50				
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00					20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
(m) Includes paper bags; (o) includes jute sacks; (u) includes sacks; (y) sacks 15c extra, rebated.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Cement City, Mich.		5x8x12—55.00¶	
Columbus, Ohio	16.00	.....	.....
Detroit, Mich. (d)	.16	.....	.18
Forest Park, Ill.	21.00*	.....	.....
Grand Rapids, Mich.	15.00*	.....	.....
Graettinger, Iowa	.16@ .18	.....	.....
Indianapolis, Ind.	.10@ .12a	.....	.....
Los Angeles, Calif.	4x8x12—5.00*	4x6x12—4.20*	
Oak Park, Ill.	18.00	.....	.....
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.18@ .20	.....	.....
Tiskilwa, Ill.	.16@ .18†	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain. (d) 5x8x12—65.00 M, 5½x8x12—68.50 M.

Cement Roofing Tile

Prices are net per sq. in. carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.

Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00

Cicero, Ill.—Hawthorne roofing tile, per sq.

	Chocolate, Red, Yellow, Gray, and Orange	Green, Blue
French and Spanish†	$11.50	$13.50
Ridges (each)	.25	.35
Hips	.25	.35
Hip starters	.50	.60
Hip terminals, 2-way	1.25	1.50
Hip terminals, 4-way	4.00	5.00
Mansard terminals	2.50	3.00
Gable finials	1.25	1.50
Gable starters	.25	.35
Gable finishers	.25	.35

†Price per square.

Houston, Texas—Roofing Tile, per sq.	25.00

Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00

Waco, Texas:	Per sq.
4x4	.60

Cement Building Tile

Cement City, Mich.:	Per 100
5x8x12	5.00
Columbus, Ohio:	
5x8x12	6.50
Grand Rapids, Mich.:	
5x8x12	8.00
Longview, Wash.:	
4x6x12	5.00
4x8x12	6.25
Mt. Pleasant, N. Y.:	Per 100
5x8x12	78.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
Pasadena, Calif. (Stone Tile):	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.:	Per 100
8x8	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
Yakima, Wash. (Building Tile):	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .13; 12-in., .17½; 14-in., .25; 16-in., .32; 18-in., .40; 20-in., .50; 24-in., .80; 26-in., 1.00; 28-in., 1.10; 30-in.	1.25
Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in.	.20
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	.....
Columbus, Ohio	16.00	17.00
El Paso, Tex.—Clinker	11.00	.....
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Forest Park, Ill.	.....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50@65.00
Milwaukee, Wis.	14.00	20.00@32.00
Mt. Pleasant, N. Y.	.....	14.00@ 23.00
Oak Park, Ill.	.....	37.00
Omaha, Neb.	18.00	30.00@ 40.00
Pasadena, Calif.	10.00	.....
Philadelphia, Penn.	14.75	20.00
Portland, Ore.	17.50	23.00@ 55.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@ 25.00
Rapid City, S. D.	17.00	25.00@ 35.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	.....

*40% off List.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in
Detroit, Mich.								15.00 per ton									
Grand Rapids, Mich.		4 in. to 12 in., 72% off standard sewer price list; 15 in., 65% off; 18 in. to 24 in., 62% off; 27 in. to 36 in., 60% off															
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.80	.90	1.10	1.30	.....	.....	1.70	.....	2.70	.....	.....	.....	.....	.....
Longview, Wash.								Sewer pipe 40% off list; culvert—list									
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.							6 in. to 24 in., $18.00 per ton										
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.								12.00 per ton									
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	1.20	1.70	.....	2.00	.....	2.75	3.40	.....	6.50	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	1.00	1.13	1.10	1.60	.....	1.90	.....	2.25	3.40	.....	5.50	.....	.....
Yakima, Wash.							1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

(a) 24-in. lengths; (b) Reinforced.
†21-in. diam. ‡Price per 2-ft. length.

Recent Contract Prices for Rock Products

CONTRACTS recently let or bids received for rock products are as follows:

Portland, Ore.—The Beaver-Portland Cement Co. was awarded a contract for domestic cement at $2.90 per bbl., plus cartage, on which a charge is to be made by zones. The contract was awarded by the city council. The bid made by C. C. Cate & Co., which offered Belgian cement in paper bags at $2.30 per bbl., or in cloth sacks at $2.65, with sacks returnable at 10c, was rejected.

Weeping Water, Neb.—The Western Limestone Products Co. are offering lime for agricultural purposes for $5 per ton at the quarry in Weeping Water. The company pays 10c cash for each sack returned after it is emptied.

Herkimer, Mich.—Bids for a quantity of No. 1 crushed stone for use in county highway repair work were opened recently by city purchasing agent. Prices ranged from $1.60 to $2.50 per ton, according to places of delivery. Several bids were entered. Bids which are found to be the most advantageous, according to the various points of delivery, will be accepted.

Cleveland, Ohio.—County paving specifications have been rewritten to call for exclusive use of trap rock in resurfacing county macadam roads. The price of the trap rock will be $4.40 per ton delivered on the job.

Oklahoma City, Okla.—The Oklahoma Portland Cement Co. has granted a reduction of 6c per bbl. to Oklahoma City following a conference with the city manager and the cement company. The present price of cement in Oklahoma City is $2.85, less 40c for the return of sacks, and 10c discount for payment in 15 days. The revised price will be $2.79.

Big Tennessee Highway Letting

THE state of Tennessee recently let highway contracts amounting to $3,500,000. About 500 contractors and other interested persons were present and they came from more than half of the states in the U. S.

The largest contract was a road to be constructed of rock asphalt, with concrete base and edging, from Nashville to the Williamson county line.—*Nashville* (Tenn.) *Tennesseean.*

Texas Mills Meet at Dallas for Regional Cement Industry Safety Sessions

REPRESENTATIVES of all seven of the portland cement mills of Texas assembled at Hotel Baker, Dallas, Tex., on Friday, April 6, for a regional safety meeting under the auspices of the Portland Cement Association. As this was the first time an attempt has ever been made to get the operating men of Texas together, there was some speculation as to the outcome on account of the long distances to be traveled. The results of the meeting were not only highly satisfactory but led Texas cement executives to

F. O. Morgan, vice-president, Texas Portland Cement Co.

predict a new era in the Lone Star State so far as mill safety is concerned.

Texas has had quite an enviable record during recent years, the mill of the San Antonio Portland Cement Co., at Cementville, having won the first Portland Cement Association trophy, awarded for a year's operation with only three accidents in 1923. The same mill won the trophy again in 1927 for operating that year without a single accident. The six mills in operation in Texas during 1927 suffered only 28 lost-time accidents, an average of 4⅔ per mill reporting as compared with the average of 10 per mill for 136 plants throughout America.

The entire program presented at the meeting was as follows:

10:30 A.M. Meeting called to order by William Moeller, general superintendent, Texas Portland Cement Co., Dallas, chairman of meeting committee.

Report on Safety Work in the Cement Industry in 1927. A. J. R. Curtis, secretary, Committee on Accident Prevention, Portland Cement Association.

How to Get Workmen to Report for First Aid. J. W. Ganser, chief chemist, Trinity Portland Cement Co., Dallas.

Demonstration of the Prone Pressure Method of Resuscitation. J. M. Corder, with team supplied by the safety department of Texas Power and Light Co.

12:30 P.M. Luncheon. C. E. Ulrickson, vice-president, Trinity Portland Cement Co., Dallas, presiding.

2:00 P.M. Afternoon Session.

The Annual Trophy Competition

(a) How It Feels to Win a Trophy Twice. Sam J. Janecek, assistant superintendent, San Antonio Portland Cement Co., San Antonio.

(b) How It Feels to Lose Out. J. E. Bonnell, superintendent, Texas Portland Cement Co., Dallas.

The Proper Reporting of Accidents. Thomas E. Gibson, manager engineering department, Lumbermen's Reciprocal Insurance Co., Houston.

Use and Handling of Explosives (motion pictures). E. M. Howland, Hercules Powder Co.

Reducing Electrical Hazards

C. J. Rutland, safety engineer, Texas Power and Light Co., Dallas.

J. A. Baker, superintendent of safety, Dallas Power and Light Co., Dallas.

C. F. Ulrickson, vice-president, Trinity Portland Cement Co.

H. E. Nichols, superintendent, Southwestern Portland Cement Co.

Round Table Discussion of Current Safety Problems, led by L. J. Wheeler (superintendent, Kansas Portland Cement Co., Bonner Springs, Kan.), G. P. Horn (chemist, San Antonio), C. J. Lofstadt (superintendent, Texas, Houston), H. E. Nichols (superintendent, Southwestern), J. W. Ganser (chief chemist, Trinity, Dallas), J. E. Bonnell (superintendent, Texas, Dallas), A. A. Chaney (superintendent, Trinity, Fort Worth), R. O. Bartholomew (superintendent, Trinity, Houston).

6:30 P.M. Safety Dinner and Rally. E. S. Morgan, vice-president, Texas Portland Cement Co., Dallas, toastmaster.

Address by Homer R. Mitchell, vice-president and general manager, Texas Employers' Insurance Association, Dallas.

Playlet, "Steve Dotey's Luck." Courtesy Dallas Power and Light Co.

Charles E. Ulrickson, vice-president and general manager of the Trinity Portland Cement Co., with mills located at Dallas, Fort Worth and Houston, talked encouragingly of the operating situation in Texas at the present time, pleading with the superintendents and foremen present to take back the knowledge and enthusiasm of the meeting to every individual worker. Mr. Ulrickson, who for a

number of years acted on the committee on accident prevention of the Portland Cement Association, praised the work of the latter and urged close co-operation by all of the mills. E. S. Morgan, vice-president of the Texas Portland Cement Co., spoke along similar lines and hopefully looked forward to an opportunity a year hence to come back and recall an even more splendid record of accomplishment. Charles Baumberger, Jr., vice-president of the San Antonio Portland Cement Co., brought the greetings and best wishes of Charles Baumberger, Sr., president of the San Antonio company, who was in Mexico and therefore could not be present as he had hoped. H. E. Nichols, superintendent of the El Paso plant of the Southwestern Portland Cement Co., brought the greetings of C. C. Merrill, vice-president and operating head of that company. Telegrams of greeting were received during the meeting from J. B. John, chairman of the committee on accident prevention of the association, and J. W. Johnston, vice-president of the Alabama Portland Cement Co., who acted as chairman of the similar meeting recently held in Birmingham.

Interest displayed by Texas state official bodies having to do with insurance and compensation matters was very marked. Hon. W. B. Shoe, of the state board of insurance commissioners, spoke briefly at the dinner, warmly praising the work of the safety committee and encouraging even greater effort. Mrs. Espa Stanford of Austin, member of the state accident board, also spoke helpfully.

Texas casualty insurance underwriters, who maintain an active movement for the reduction of industrial accidents, were well represented by Thomas E. Gibson of Houston and Homer R. Mitchell of Dallas. Mr. Mitchell, in his remarks as speaker of the evening, said that the cement industry was in a class by itself so far as accident reduction was concerned and that he was eager to take the story and the statistics concerning the work to other industrials throughout the state. Mr. Mitchell said that this work in the cement industry had already begun to bear real fruit. Whereas the industrial insurance rates in the state had gone up around 50% since the compensation law went into effect, according to Mr. Mitchell the rate for cement mill workers had dropped about 40% during this period and might be expected to go lower.

William Moeller, general superintendent of the Texas and Kansas Portland Cement companies, who presided at both morning and afternoon sessions, expressed himself as well satisfied with the results of the meeting and extended the thanks of the cement men to the Texas Power and Light Co. and the Dallas Power and Light Co. for the very effective help of the electric power-making interests.

The total attendance, including visitors and guests, was 96. The registration, which included 73 representaives of the Texas mills, was as follows:

Registration

Kansas Portland Cement Co., Bonner Springs
L. J. Wheeler, superintendent.

San Antonio Portland Cement Co., San Antonio
Charles Baumberger, Jr., vice-president.
G. P. Horn, chemist.
Sam J. Janecek, assistant superintendent.

Southwestern Portland Cement Co., El Paso
A. M. Daniels, mill foreman.
H. E. Nichols, superintendent.

Texas Portland Cement Co., Houston and Dallas
J. C. Allen, repairman.
J. E. Bonnell, superintendent.
Otto P. Brandt, mill foreman.
Charles Bremer, general foreman.
J. A. Brown, yard foreman.
George G. Gasper, stenographer.
J. T. Clemons, weight inspector.
R. L. Cone, repairman.
J. W. Coppinger, carpenter foreman.
C. S. Couchman, electrician.
K. E. Davis, quarry foreman.
Will Dietz, quarry representative.
G. C. Duncan, chief mill clerk.
C. H. Evans, draftsman.
F. F. Fasting, waste heat foreman.
Harry Flora, night mill foreman.
L. M. French, stenographer.
Robert Frost, engineer.
J. P. Groth, blacksmith.
O. L. Hailey, Jr., chief chemist.
A. H. Hamilton, chief electrician.
G. R. Harper, general mill foreman.
N. A. Henderson, watchman.
E. A. Hume, burner.
N. P. Johanson, draftsman.
W. H. Kelsey, mill foreman.
C. J. Lofstedt, superintendent.
E. S. Morgan, vice-president.
Frank Smith, steam-shovel engineer.
J. H. Sparks, storekeeper.
James Thorp, electrician.
E. C. Vance, machine shop foreman.
D. Wardlow, repairman.
J. D. Wilson, repair foreman.

Trinity Portland Cement Co., Houston, Dallas, Ft. Worth
R. T. Bartholomew, superintendent.
A. C. Carr, yard foreman.
A. A. Chaney, superintendent.
D. D. Day, stock keeper.
R. E. Dielmann, chemist.
J. R. Everett.
L. M. Fisher, quarry foreman.
H. Fleming, chief electrician.
A. E. Flowers, chief chemist.
R. E. Galbraith, machine shop foreman.
J. W. Ganser, chief chemist.
Ben Hammond, mill foreman.
Ed Hilton, electrician.
J. J. Horgan, purchasing agent.
Henry F. Lamb, general foreman.
George McDaniel, foreman.
A. E. Morris, packing foreman.
G. M. Orr, timekeeper.
E. S. Pickens, sack foreman.
John R. Poindexter, packing house foreman.
W. T. Ross, carpenter.
J. M. Simmons, timekeeper.
T. W. Smith, foreman.
W. O. Stuart, chief electrician.
J. D. Summers, chief engineer.
C. A. W. Sutherland, machine shop foreman.
C. E. Ulrickson, vice-president.
W. K. Williams, chemist.
L. Winders, mill foreman.
R. C. Youngblood, burner.

Others
J. A. Baker, superintendent of safety, Dallas Power and Light Co.
J. M. Corder, assistant safety engineer, Texas Power and Light Co.
E. M. Cowpland, service representative, Hercules Powder Co., Dallas.
A. J. R. Curtis, assistant to general manager, Portland Cement Association, Chicago.
Thomas E. Gibson, manager engineering department, Lumbermen's Reciprocal Association, Houston.
W. B. Oldham, Dallas.
J. W. Parkins, safety engineer, A. S. S. E., Dallas.
C. J. Rutland, Texas Power and Light Co., Dallas.
Mrs. Espa Stanford, Industrial Accident Board, Austin.
W. B. Shoe, Board of Insurance, Austin.

What the State of Washington Loses by Importation of Foreign Cement

HOW some of Washington's largest industries are losing millions by importations of foreign cement is set forth by Superior Portland Cement Co., Inc., based on a careful survey in this state made by the Cement Information Bureau.

From 1922 to the beginning of 1927, 2,594,392 bbl. of cement were imported into the Pacific coast market. As a result Washington coal mines lost the sale of $567,523 worth of coal, of which miners would have received $340,514 in wages; gypsum mines lost a revenue of $46,374, of which the miners would have received $16,231 in wages; power plants lost $415,103; textile mills lost $151,283 which would have been spent for sacks; cotton farmers lost $76,140, and the railroads lost $1,970,490.

The industry at present in the five counties—King, Skagit, Whatcom, Spokane, and Pend Oreille—is capable of turning out 3,907,000 bbl. a year, and when plants now under construction are completed the total capacity will be 5,407,000 bbl. annually.

When the new mills are completed, capital amounting to over $16,000,000 will be invested in this industry. If these plants could run to capacity their payroll would total $2,669,780, in addition to giving employment to 2378 other workers earning $3,088,518.

For its activities this industry would buy as principal materials:

471,966 tons of coal costing	$1,179,924
26,666 tons of gypsum costing	96,415
1,756,925 sacks costing	281,108
New machinery and supplies	2,023,920
Electric power	863,030
And add to railroad revenues	4,095,310
A total contribution to other industries of	$8,539,707

These industries, their employes and those from whom they buy are all adversely affected by the importation of foreign cement, made by workmen whose wages average 15 cents per hour.—*Seattle* (Wash.) *Star.*

Monolith Portland Project at Port Aransas, Texas

THE Monolith Portland Cement Co. of Monolith, Calif., will start construction at Aransas Pass, Texas, soon of a shell cement plant with annual exports of around $4,000,000, it was disclosed in a brief for deeper water at Port Aransas filed by Frederick C. Robertson, attorney with the district engineer at Galveston. The plant will be located on harbor island just inside the jutties of Port Aransas.

A deposit of $5000 for shell to be used in the manufacture of cement was made with the state some time ago. About 350,000 tons will be shipped the first year, Coy Burnett, president, said.—*Houston* (Texas) *Post-Dispatch.*

Members of safety committees from the three John T. Dyer plants and their guests

John T. Dyer Co. Employes Hold First Annual Safety Banquet

ON March 20, representatives of the three quarries of the John T. Dyer Quarry Co., Birdsboro, Penn., met in their first annual safety banquet and get-together meeting at the Hotel Rockland. This is the first of a series of meetings which are to be held as part of an active campaign for the prevention of accidents. At this banquet were the members of the safety committees of the three Dyer plants, together with the officials of the company, and invited guests from outside of the organization.

Wm. A. Kelly, superintendent at the Monocacy, Penn., plant, was chairman of the meeting. Thomas J. Quigley of the Pennsylvania Department of Labor and Industry, was the principal speaker of the evening. He stressed the causes of accidents in the quarry industry and reviewed the accident situation in the state for the past three years, pointing out the losses incurred to employe and employer through a half-hearted interest in accident prevention. A short talk was also given by E. T. Wolf of E. I. du Pont de Nemours and Co.

F. T. Gucker, president and general manager of the John T. Dyer Quarry Co., addressed the meeting, voicing confidence in the ability of the men who were at the dinner to put across anything that they set out to do in the way of accident prevention. He also assured the group of the co-operation of the management, which was strictly in sympathy with the movement. The chairmen of the safety committees, Fred J. Stephens and A. H. Gumpert, presented their views on the movement and full support to the management in the work for safety.

The business meeting closed with the announcement of the safety competition and safety award to be given to that plant of the Dyer company, having the best safety record from April 1, 1928, to December 31, 1928. A bronze plaque suitably engraved with the name of the winner will constitute the award.

For the entertainment for the evening the motion picture of the 1,000,000-ton shot at the Monocacy plant of the Dyer company was shown. This was the shot on May 30, 1927, in which 86 tons of dynamite was used. This feature of the entertainment was given by Phillip Jones of the du Pont company.

Progress on Plant of Pacific Coast Cement Company

ACTUAL construction of the projected $3,000,000 Seattle plant of the Pacific Coast Cement Co., contemplating ultimately an expenditude of $4,000,000, has begun on the East Waterway, Seattle.

Contracts are being let for the foundation piling and railroad tracks. Construction of the concrete foundations, upon which machinery due in April will be placed, will follow soon. The plant is expected to be producing cement in November, it was announced by N. D. Moore, vice-president of the cement company and also a vice-president of the Pacific Coast Co., the parent concern.

The ceremonies beginning construction were participated in by President Hatch; the mayor-elect Mr. Edwards; Mr. Moore, vice-president; Maj. S. E. Hutton, the company's chief engineer, who will have charge of construction, and Mrs. Lillian Smith of the Pacific Coast Co.'s executive offices. Mr. Edwards was accompanied by Capt. A. A. Paysse.

The Pacific Coast Cement Co. is endeavoring to purchase in the Puget Sound district as much of its equipment and material as it can, and it hopes to be able to award most of the construction contracts to Northwest concerns, Mr. Moore said.

Lime rock used in the manufacture of the cement will come from Alaska near Ketchikan, where quarry construction now is going on. Clay will come from the company's property along the Duwamish waterway, and coal will be supplied by the Pacific Coal Co.'s mines nearby.

Sales for the new company will be directed by Vice-President Wylie Hemphill, assisted by Sales Manager Darwin Meisnet, with headquarters at Room 608, L. C. Smith Building.

It is estimated that the company will employ 150 men, with an annual payroll of $300,000.—*Seattle* (Wash.) *Post-Intelligencer.*

Knoxville Cement Plant Will Start Soon

THE plant of the Volunteer Portland Cement Co. at Knoxville, Tenn., will be placed in operation about the middle of April, Charles F. Lewis, general manager, announced recently.

The buildings have been practically completed and together with the equipment represent an expenditure of approximately $2,000,000.

The plant when placed in operation will employ between 110 and 120 men. Most of that number will be skilled labor.

Output of the plant will be about 3000 bbl. per day.—*Knoxville* (Tenn.) *Journal.*

James G. Shaw Returns to the Crushed-Stone Industry

JAMES G. SHAW, vice-president and manager of the Seaboard Sand and Gravel Co. has returned to the crushed stone industry, with which he was so long identified as vice-president and general manager of the New York Trap Rock Corp.

Mr. Shaw is vice-president and general manager of the recently formed Standard Trap Rock Corp., 26 Courtland St., New York City. William B. Duncan is president and Anderson Dana is secretary-treasurer. All three hold the same positions in the Seaboard company. The Standard Trap Rock Corp. has completed arrangements and let the contract for a plant at Piermont, N. Y., which is a short distance above the New Jersey state line on the Hudson River, which according to all reports received, will be one of the finest crushing plants, both from a mechanical and a structural viewpoint, that has been erected. It has been designed by Allis-Chalmers engineers and it will have a capacity for 400 tons per hour of screened and washed product. The primary breaker is a 60x84-in. "Superior" jaw breaker. An unusual feature of the design is that there are no elevators. Storage will be in six concrete silos which will hold 1300 yd.

The natural conditions at the quarry are said to be almost ideal as there is a natural face 2000 ft. long averaging 160 ft. in height. No stripping is required. Steam shovels will load trucks fitted with special bodies made by the Easton Car and Construction Co.

The Burrell Engineering and Contracting Co., Chicago, Ill., has the contract for building the plant.

Moundsville Sand Company to Construct New Plant

THE construction of a new plant said to be one of the most modern of its kind along the Ohio river will be started soon by the Moundsville Sand Co. at Moundsville, W. Va.

Part of the structure is already under construction, a local contractor being engaged in constructing large concrete bins for sand and gravel, equipped for quick loading of trucks, railroad cars and boats.

The new plant is to be located on the Ohio river bank a few hundred feet north of the mouth of Little Grave creek and south of the Alexander mine tipple. The company will continue to operate its present bank plant on the B. & O. and state road.

The company will secure its gravel from the south end of the large gravel bar that extends more than half way across the Ohio river. Instead of using a dredge boat and barges, the company will employ a cableway dragline excavator.

Capacity of the new plant will be 20 cars a day. The company has a capitalization of $100,000 and its incorporators are Walter A. McGlumphy and A. C. Swift, Moundsville, and Walter Smith of Wheeling.—*Wheeling (W. Va.) Intelligence.*

U. S. Gypsum Completes New Paper Mill at Kansas City

A MODERN chip-paper manufactory was recently put in operation in North Kansas City, Mo., by the United States Gypsum Co. The new building is of fireproof brick and steel construction; building and ground represent an investment of approximately $400,000.

The Kansas City paper mill is the fourth to be built by the company. Other mills are at Oakfield, N. Y., Gypsum, Ohio, and Lancaster, Ohio. Each mill manufactures chip papers for the surfacing of the company's board products—"Sheetrock," "Sterling" and "Crown" wallboard, "Gyplap" sheathing and "Bundled Rocklath" plastering base.

Normally 75 persons are employed at the Kansas City plant. Several varieties of chip paper are made: News-lined chip paper, open-laced chip paper, and a heavy, water-resisting chip paper. The equipment is of the most modern type; in consequence, it is not unusual for the mill to run for two weeks without interruption to the flow of the finished product, and the only breaks in the paper sheet, as it comes from the machines, are made by the workmen removing rolls.

The United States Gypsum Co. now operates five southern plants as follows: Kansas City, Mo.; Sweetwater, Texas; Plasterco, Va.; Southard, Okla., and Eldorado, Okla. The largest of these is the Sweetwater plant, which has a daily capacity of 100,000 sq. ft. of wallboard and 400 tons of plaster.

Booneville Sand Co. Builds

THE BOONEVILLE SAND CO., of Utica, N. Y., is building a new sand and gravel plant at Stirling Creek, about seven miles from Utica in the direction of Frankfort. The deposit is mostly gravel and the plant has been designed and built to produce as much crushed gravel as possible. There are two crushers, a 5-ft. and 4-ft., both Symons cone crushers. The larger will be used as a primary crusher and the smaller for secondary crushing. The main screen will be a Galland-Henning screen of the rollerless rotary type.

The deposit is to be worked with a dragline excavator and quarry cars or trucks.

All the product, crushed and uncrushed, will be washed. An Eagle washer will be used on the gravel and a Dorr sand washer on the sand.

This company has recently made improvements in its North Illion plant in which it has installed Telsmith automatic sand tanks.

Gypsum Block and Plaster from By-Product of Fertilizer Material

THE U. S. PHOSPHORIC PRODUCTS CORP., of Tampa, Fla., plans the installation of a plant for the manufacture of gypsum plaster and gypsum block. The company has available for the purpose a large supply of raw material, derived as a by-product from the manufacture of triple-superphosphate, a fertilizer material.

As a result of extensive tests the company claims that, owing to certain constituents, it has been found to have in many respects superior advantages for the manufacture of gypsum blocks and plaster.

Due to the cheap source of raw material the company plans to set a comparatively low price for gypsum blocks and hopes to popularize their use in the non-bearing partitions of frame structures. The use of these blocks has heretofore been confined principally to large buildings or semi-fireproof or fireproof construction. The present daily capacity of synthetic gypsum at the Tampa plant is about 500 tons.

The U. S. Phosphoric Products Corp. is a subsidiary of the Tennessee Copper and Chemical Corp., New York, which took over the Tampa plant of the United States Export Chemical Co. about a year ago.

City Engineer Makes Protest Against Local Rock

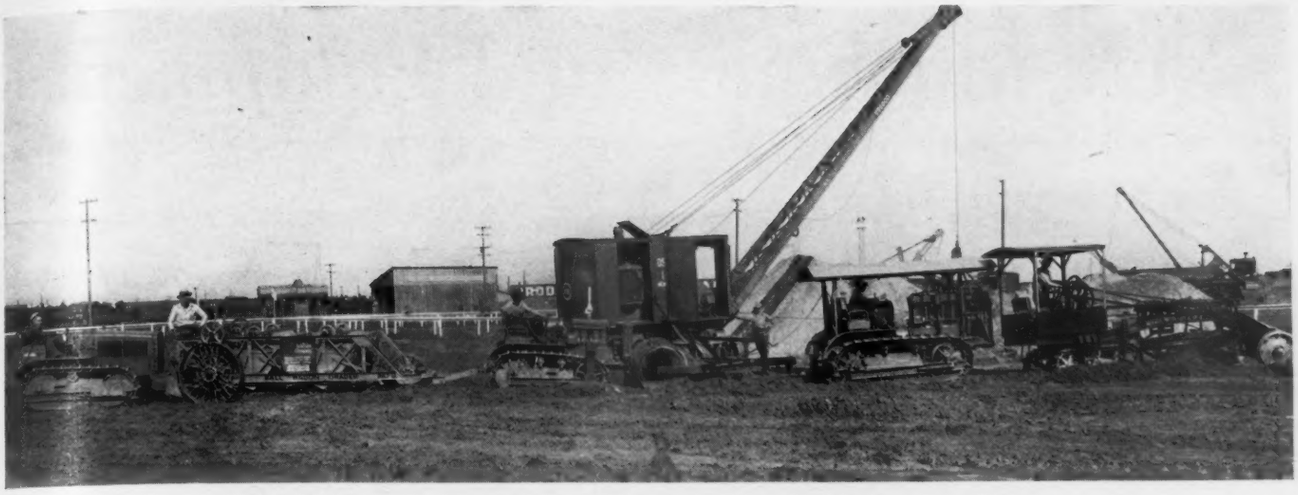
D. C. HANNEY, city engineer of Ashland, Ore., has been making a fight for good aggregate to be used in the construction of a dam near the city, according to Oregon papers.

It was originally proposed to use a granite found near the dam as aggregate, the crushing to be done at the dam site. Mr. Hanney pointed out the unfitness of the granite for aggregate, showing that it was of a coarsely crystalline variety and that some of it was so soft it could be broken with the hands.

He recommended that commercial washed gravel, which is of excellent quality in that locality, be selected as aggregate and said that this purchased aggregate would permit the arch type of dam to be built.

At a recent meeting of the Ashland city council it was decided to follow Mr. Hanney's recommendations throughout. The bond of a construction company which had put in the lowest bid, with the proviso that it could crush the granite spoken of for aggregate, was returned, and the bid cancelled.

The failure of the St. Francis dam in California caused the city council to scrutinize the plans more carefully than it had in previous sessions. It was determined to design the safest possible type and use the best materials obtainable for the Ashland dam.



Equipment in action on the demonstration field at the Western Road Show

Western Road and Equipment Exposition Held at Los Angeles

Demonstration Field Provides Unusual Feature for Show

THE Western Road and Equipment Exposition, held on March 7 to 11, in Los Angeles, presented many interesting and new features in the way of machinery shows. Almost every known piece of road building machinery was on display in the big exposition tent, including a great many of the units in daily use by rock products producers all over the country.

Probably the most interesting feature of the exhibition was the demonstration field adjacent to the exposition tents where the equipment was actually shown at work. Here in competitive performance, shovels, cranes, graders, backfillers, trenchers, caterpillars, tractors and many other kinds and types of machinery were demonstrating their advantages to all the visitors at the exposition. Many motor truck companies had excellent exhibits.

One of the notable features of this exposition was the special effort made by the various Pacific coast machinery dealers to acquaint visitors with the special lines made by the machinery manufacturers which they represent. One of the largest trade representatives on the coast, the Smith Booth Usher Co. of Los Angeles, presented an exhibit of 17 different manufacturers which they represent, including the Barber-Greene Co. of Aurora, Ill., the Easton Car and Construction Co., the Hercules Motor Corp., Canton, Ohio; Sauerman Bros. of Chicago, Geo. D. Whitcomb of Rochelle, Ill., and the Foote Co. of Nunda, N. Y. Harron, Rickard and McCone of San Francisco and Los Angeles had on exhibit a large display of equipment from eight different companies, featured by their exhibition of Koehring Co. machinery, which included two gasoline shovels, and a gasoline crane.

Stuart, Smith and Co. of San Francisco included in their display a small working model of a Telsmith crushing and screening plant which attracted considerable attention. Spears Wells Machinery Co., Inc., of Oakland, Calif., displayed their Spearwell Mogul loader and excavator. Four P. & H. power shovels were in operation on the demonstration field as well as some Northwest Engineering Co.'s shovels. Norris K. Davis Co. of San Francisco displayed portable concrete mixers as well as their plaster mixer. The Edward R. Bacon Co. of San Francisco had an extensive display of machinery handled by them.

The Western Road and Equipment Exposition is an extension and elaboration of the All-Western Road Shows, which were conducted by the western distributors of contracting equipment during the past years in San Francisco, Calif. So profitable were these exhibits to Eastern manufacturers of road-making machinery and so interesting and valuable to the thousands of western road contractors and officials who attended that it was decided to broaden the scope of the shows into a comprehensive exposition of contracting machinery and equipment of all kinds in order that general building contractors and engineers also might have opportunity to inspect complete lines of equipment, both as stationary exhibits in the tents and under actual competitive performance on the demonstration field.

In the exhibition tent at the Los Angeles exposition

New Machinery and Equipment

New Welder Tractor Combination

AN improved combination of electric arc welder and Fordson tractor has been brought out by the General Electric Co., Schenectady, N. Y. The principal improvements consist of the substitution of new type welding equipment and the addition of head and tail lights and a protective cover. This outfit is now being marketed direct by the General Electric Co., whereas the older outfits, although utilizing G. E. welding equipment, were not sold by that company.

The principal equipment consists of a standard Fordson tractor, belt-connected to a type WD-300-A, 25-volt, 300-ampere one-hour rated 1750-r.p.m., ball-bearing generator. This unit is mounted directly on the tractor and is protected by metal canopy and canvas side curtains. Other equipment includes a governor, a power take-off, a muffler, waterproofed pulleys on the engine and generator, a belt and belt tightener, industrial (disc type) rubber-tired wheels in front and rear, an extension frame, off-set crank, control panel and reactor, head and tail lights, and a battery and charging control. As optional equipment, light industrial (spoke type) wheels in front and rear are available as are also standard Fordson farm wheels for front and rear.

The overall length of the complete unit is 12 ft.; the height is 4 ft. 8 in.; the width is 5 ft. 2 in. and net weight is approximately 4900 lb. The outfit has been particularly designed to provide construction industries with a complete, portable welding machine suitable for hard, continuous use, the manufacturers say. Nor has the utility of the tractor as a hauling device been impaired, it is claimed. For field use, the unit will haul equipment and tools to the job and then supply welding current for the work. It is also stated that extra long welding leads are not necessary because the equipment is so easily moved at a moment's notice.

The battery, which supplies current for the lights and ignition, is charged while the welding generator is operating. It is provided with ammeter and automatic cutout.

Chain link fabric used for machine guards

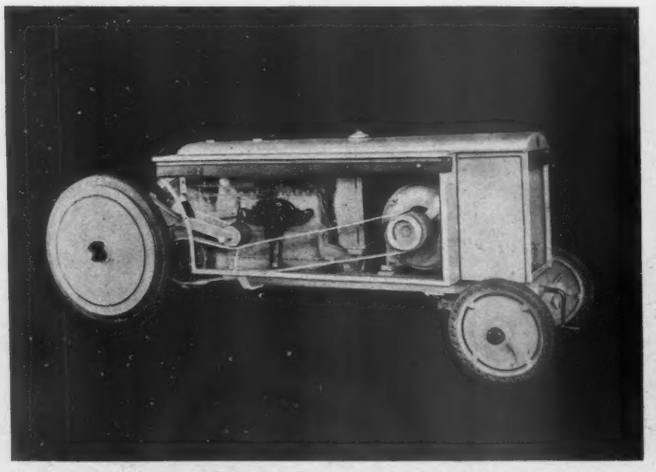
Machine Guards from Chain Link Fabric

THE accompanying illustration shows an improvised guard from flying belts, whirling pulleys and open gears, constructed from piping angle irons and pieces of a chain link "Hi-way" guard made by the Page Steel and Wire Co., Chicago, Ill., who claim as features for this particular purpose, its low cost, non-obstruction of light, easy access to the equipment and its simplicity of construction. The particular guard is in use at a plant in Ontario where it is said to have proven satisfactory.

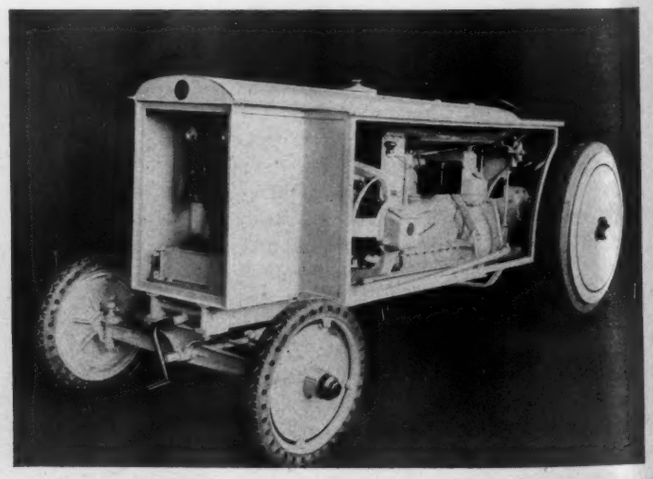
Radiator for Diesel Engine

A NEW type of radiator for Diesel and heavy-duty engines has just been announced by the Perfex Corp., Milwaukee, Wis. In this radiator a large air-circulating fan is mounted directly on the radiator frame. This is protected by a screen and shrouded to provide uniform air circulation over the entire radiator. The fan is carried on anti-friction bearings and is provided with a large enough belt pulley to insure positive fan operation over long periods without attention according to the manufacturer's reports. It is also claimed that this installation eliminates the usual difficulty found in attempting to mount the fan on a Diesel engine in such a position that the radiator may be efficiently cooled.

These radiators also incorporate late developments in removable core sections. Each unit is securely held in place by four nuts, which permits the removal and repair of any individual section without dismantling the entire radiator. It is also possible to continue operation of the power plant for a reasonable period while a section is out, or



Combination tractor and welder, showing motor belt-connected to the generator



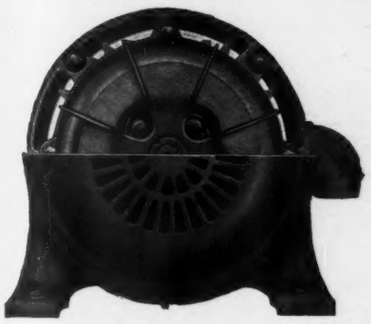
View showing controller and coil box on new welder tractor combination

as an alternative, to put in a reserve section in the place of the damaged section which can be done in a few minutes, the manufacturers claim.

The cores of these heavy duty radiators are made from copper to prevent corrosion. The tubes are oval in shape and have double lock seams that make them burst-proof when frozen, according to the company's claims. Copper, heat-radiating fins, strengthened by hemmed front and rear edges, furnish an efficient design of cooling unit. These are baked on to the tubes in ovens that have automatic temperature control to insure uniformity in the product. The Perfex Corp. now has a line of these radiators that are available in sizes from 50 to 350 hp.

New Air-Jacketed Motor

AN air-jacketed motor for serving where dust fumes and moisture are present in sufficient quantities to make protection to the internal parts of the motor necessary, has been developed by the Wagner Electric Corp., St. Louis. The motor is completely sealed, according to the manufacturers, and there is a jacket surrounding it, which is open at both ends with a fan on the extended shaft as shown in the drawing. It is claimed that the only clearance between the rotating and the stationary parts is in the bearing housing, and this is grease-packed to prevent dust or other matter getting past. The motors have double-row ball bearings, self-aligning in one end plate and deep grooved in the other end to take end thrust. The motors are new in external construction only, no changes having been made in the electrical principles of the motors themselves. The frame housing, the motor proper and all bearings are substantially air-tight, it is claimed. The end shield is made of cast iron, rib-reinforced and has a substantial grating which protects the fan and provides an opening for incoming ventilating air. The center shield is made of heavy sheet steel held in place by slot head bolts. The fan is of one piece construction. The conduit box is mountable in four positions.



Air-jacketed motor, with end shield cut away, showing fan and air ducts

The stator is the only part of the standard single phase repulsion-induction and polyphase squirrel cage motors which is changed in design. The exposed outer rim is deeply grooved to increase radiation surface. The punching for windings remains unchanged. The stator laminae are welded together to lessen vibration and reduce magnetic noises.

The company manufactures a line of single-phase, repulsion-induction motors in sizes from 1 hp. to 20 hp. and polyphase squirrel-cage motors in sizes from 2 hp. to 30 hp. These motors are designed for a temperature rise not to exceed 50 degrees centigrade and the manufacturers claim they meet all A.I.E.E. and N.E.L.A. standards.

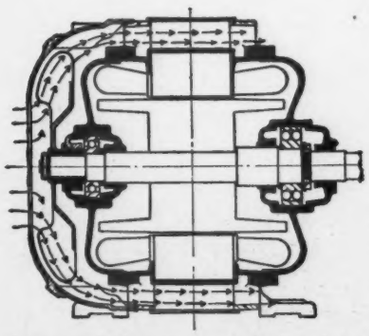
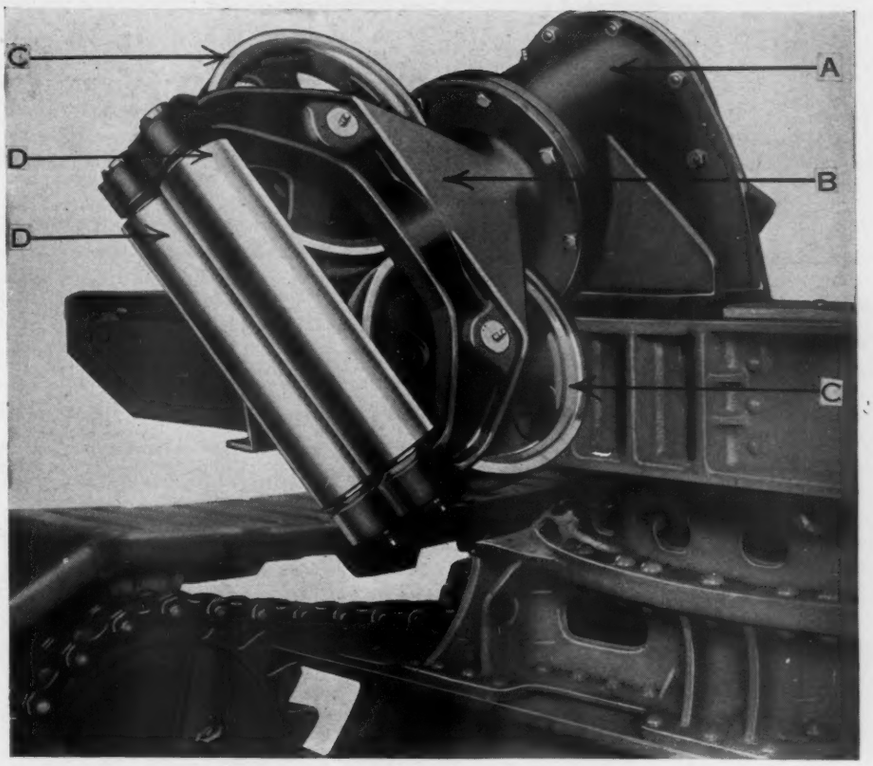


Diagram indicating passage of air through jacket around the enclosed, dust-tight motor



New type of fairlead for use on draglines

New Dragline Fairlead

THE Northwest Engineering Co., Chicago, has announced a new fairlead for dragline service, designed for the company's type M, models 104 and 105 draglines. The chief feature of this fairlead lies in the reduction of wear on the drag cable, according to the manufacturer's report. The cable can lead to either side of the machine to an angle of 75 deg. and not rub or scrape in any way on anything, it is claimed. It is in contact with but one sheave at a time and the sheaves are large enough to insure a minimum amount of bending.

The fairlead consists of a rigid steel housing (A) bolted to the rotating base casting. This is bored to receive two races of roller bearings in which the rotating portion (B) turns. This rotating portion carries two sheaves (C-C) and two rollers (D-D). The drag cable passes between D-D and C-C and through (B) and (A), which are hollow to receive it. As the angle of the cable swings the fairlead rotates to suit. The rollers D-D take the momentary sideways push and the sheaves guide the final pull, according to the company's report.

New Carbic Sales Agents

THE Carbic acetylene floodlight which is used by rock products producers to operate night shifts, and the Carbic acetylene generator, as well as other Carbic equipment utilizing acetylene, formerly sold by the Carbic Manufacturing Co., Duluth, Minn., will in the future be distributed exclusively by the Oxweld Acetylene Co., 30 East 42nd street, New York.

The processed carbide in cake form, sold under the trade-mark Carbic, for Carbic lights and generators, will be also distributed exclusively by the Union Carbide Sales Co., New York, through its chain of warehouses.

News of All the Industry

Incorporations

Pacific Rock Co., Oakland, Calif., $40,000. T. L. Croteau, T. L. Pray and E. B. Stauffer.

Anderson Stone Co., Fort Smith, Ark. H. C. Bass, 701 Oakland Pl., and others.

Armostone Corp., Newark, N. J., $2,500,000. Cement, plaster, lime.

Alabama Quenalda Graphite Co., W. L. Shumate, Pres., Corner Bldg., Birmingham, Ala.

Capitol City Gravel Co., Indianapolis, Ind., $40,000. F. L. Galbraith.

Roedel Tile Co., Portland, Ore., increase capital stock to $20,000.

General Mining Co., Inc., St. Louis, Mo. A. Mueller, M. Yawitz, 208 N. Broadway, St. Louis.

Marble-ite Corp., Memphis, Tenn. To manufacture synthetic stone. G. H. Partin and others.

Charles River Sand and Gravel Co., Newton, Mass. 250 shares, no par value. Pres., Salvatore Messina.

Rome Concrete Products Co., Rome, Ga., reported organized, with F. C. Burghart, Miami, Fla.; daily output of 2000 blocks.

California Onyx Co., Los Angeles, $100,000. George D. Mitchell, H. Eisele, F. W. Brand, H. W. Elliott and E. J. Louis.

Hollow-wall Tile Co., Los Angeles, Calif., $25,000. Hardy Bowles, N. K. Pritchard and K. C. Newell.

Kokomo Stone Co., Kokomo, Ind., 376 shares, no par value; mining, quarrying, manufacturing, producing, buying, selling, dealing in and marketing limestone, sandstone, blast furnace slag.

Patapsco Power, Light and Mineral Co., Marriotsville, Md., $100,000. W. H. D. Warfield, Pres., Main St., Sykesville, Md. Reported to prepare feldspar, limestone and flint for commercial purposes.

Augusta Lime Sales Corp., Staunton, Va., $50,000 capital stock, with a minimum of $5000. Shares $100 each. Lime and lime products. R. L. James, Pittsburgh, Pa., president; M. H. Lambert, Staunton, Va., vice-president and treasurer

Lansing Duntile Co. has been incorporated in Lansing, Mich., for $50,000 to manufacture concrete block. Ray Clark, R. F. D. No. 2, Lansing, is president. Edgar D. McClure, R. F. D. No. 4, Mason, vice-president, and Irving C. Holloway, 604 E. Mt. Hope Ave., is secretary-treasurer.

Montana Gypsum Products Co., Anaconda, Mont., $250,000, has recently filed articles of incorporation for the mining, processing and marketing of Montana gypsum, according to Butte men prominent in the organization. The company was organized by Dr. L. C. Ford of Lima, E. C. Davis, George W. Craven, Garfield B. Perier and Alex Walker, all of Butte, Mont.

Quarries

Kirkwood, Mo., is reported to be planning for a municipal crushed stone quarry.

Monarch Cement Co. is adding a washing plant to its rock crushing plant at Sand Springs, Okla.

Blue Diamond Co., Los Angeles, sustained a loss of $100,000 when fire damaged its plant in Temescal canyon, near Corona, Calif.

Rock Island railway is reported as contemplating the building of a ballast plant near Princeton, Mo.

B. G. Hoadley Quarries Co., Arlington, Ill., is reported to have developed the third floor of its quarry.

George P. Heinz Co. of Denver, Colo., recently purchased a stone quarry in the vicinity of Del Norte, Colo.

Arnold Stone Quarry, St. Genevieve, Mo., is to be reopened shortly. The stone from these quarries will be used in Mississippi River improvement work.

Banner Rock Products Co., Alexandria, Ind., was recently damaged by a blaze in the engine room. The loss is estimated at approximately $1000.

Likins Brothers, Wellsburg, W. Va., have leased a stone quarry near Ice's Ferry and will begin operations shortly. Railroad ballast, stone for road work and agricultural lime will be produced.

Salem Quarries, Forsyth county, North Carolina, has recently started the operation of a plant near Winston-Salem for the production of crushed stone. It is reported that the plant will have a capacity of 600 tons a day.

Sand and Gravel

Tampa Sand and Shell Co., Chattahoochee, Fla., has recently constructed a $45,000 plant on the river near Chattahoochee.

West Sand and Gravel Co., Sacramento, Calif., has taken over the retail business of the Mucke Rock and Sand Co.

F. C. McGee, Haney, British Columbia, has begun construction work on new gravel bunkers on the banks of the Alouette river.

Crystal Sand Co., Mission, Tex., was recently sold to E. J. Bayse of Houston. Modern equipment will be installed, according to the new owner.

East End Sand and Gravel Co., Chillicothe, O., has been reorganized and is reported to be making extensive improvements in its plant.

The Marysville Sand Co., Marysville, Calif., has recently acquired a 30-acre sand tract along the banks of the Yuba river.

Porter Construction Co., Lobart, Ore., has recently added new equipment to its sand and gravel plant. Capacity of the plant is 300 yd. daily.

Janesville Sand and Gravel Co., Janesville, Wis., expects to soon occupy its new two-story fireproof office building.

Pacific Rock Co.'s new rock and gravel plant at Centerville, Calif., is under construction. The spur line from the main track has just been built.

Olympia Sand and Gravel Co. and the Martin Hardware Co., both of Olympia, Wash., have recently consolidated their building material work into one centralized distribution center.

Coulter Co. property at Sevenmile, O., and chattel property at Oxford, O., was sold at sheriff's sale recently. C. C. Bartlett, Norwood, O., is the new owner.

Morgan and Bird Gravel Co., Shreveport, La., gravel suit was recently dismissed. The mandamus proceedings from the western district of Louisiana to force bankruptcy upon the firm was denied by the United States circuit court of appeals.

Cement

Northwestern Portland Cement Co. is reported to have started its plant at Grotto, Wash., April 1.

Northwest Duntile Corp., Everett, Wash., has begun work on a 1-story warehouse, 25x104 ft.

Atlas Portland Cement Co., Independence, Kan., recently held the second annual safety banquet. C. M. Carman presided.

Algonite Stone Mfg. Co., Houston, Tex., is planning the establishment of a $50,000 plant to manufacture cast stone.

Field Art Tile Co., Portland, Ore., has succeeded to the business of the Wm. E. Field Tile Co.

North Dakota Concrete Products Co., Elk River, Minn., is reported to be starting work on a new plant in Minot, N. D.

Alhambra Brick and Tile Co., Alhambra, Calif., has begun the construction of a new kiln building which will be 23x100 ft. in size.

Stoneform Corporation of America, Washington, D. C., is reported to have acquired a site at Loughborough, Md., on which is contemplated the erection of $50,000 cast stone plant.

Shearman Concrete Pipe Co., Inc., of Knoxville, are reported to have established a pipe plant with a daily output of 100 tons. F. L. Conner is president.

California Portland Cement Co. of Colton, Calif., is reported to have let a contract to the Triangle Rock and Gravel Co. of San Bernardino, for digging the clay used in making cement. About 350 tons will be shipped to the plant daily.

Superior Portland Cement Co. of Superior, O., is reported to be finding barge transportation to points along the Ohio and tributaries of increasing importance. A wharf with 10,000 bbl. storage is maintained at Cincinnati.

Lime

Diamond Springs Lime Co., Diamond Springs, Calif., has let a contract to the McGann Mfg. Co., York, Penn., for a complete 150 tons per day Schulthess hydrate plant. Work on the foundation has been started; the lime company will do its own erecting. The engineers are Smith-Emery Co. of Los Angeles.

Agricultural Limestone

Lime Products Co. is opening up a quarry near Falls City, Ore., for the purpose of producing ground limerock for agricultural purposes.

Gypsum

United States Gypsum Co., is installing modern separators at their Genoa, Ohio, plant to take care of the lime as it comes from the kilns instead of the old method of doing the separating by hand.

U. S. Phosphoric Products Co., 61 Broadway, New York, is planning the establishment of a plant in Tampa, Fla., for the manufacture of gypsum plaster and gypsum block, the supply of raw material to come from one of the byproducts of a fertilizer plant producing phosphate.

Miscellaneous Rock Products

Armour Fertilizer Co., plant at Columbia, Tenn., plan mine improvements, according to report of J. H. Chapman, Mgr.

Personals

B. F. Affleck, Pres. Universal Cement Co., has been elected president of the Union League Club of Chicago.

W. K. Squier, of the Paragon Plaster Co., Syracuse, N. Y., recently left on the S.S. President Monroe for a two months' vacation trip via the Panama Canal.

Dudley P. South, of Houston, Tex., is in Pensacola, Fla., to take charge of local operations of the Gulf Gypsum Co. The firm recently leased the east side of the municipal pier for use as a shipping base.

Walter McQuade, who has been associated for a number of years with the Rising & Nelson Slate Co., has been made editor of *The Architect*. Mr. McQuade will continue as consulting architect with Rising & Nelson in addition to his new duties.

Obituaries

Charles Woodward, attorney and vice-president of the Wisconsin Lime and Cement Co., died on March 30, 1928, at the West Suburban Hospital in Chicago, following an operation. Mr. Woodward was a member of many clubs and active in civic and political affairs.

Manufacturers

Brown Instrument Co., Philadelphia, Penn., has moved its Detroit office to the Maccabee Bldg., Detroit.

Westinghouse Electric and Manufacturing Co. announces the association of E. E. Arnold in the capacity of mechanical engineer for special assignment.

Lincoln Electric Co., Cleveland, announces the appointment of Jacob F. Savela as welding service manager for the Detroit district under the direction of J. M. Robinson, district sales manager.

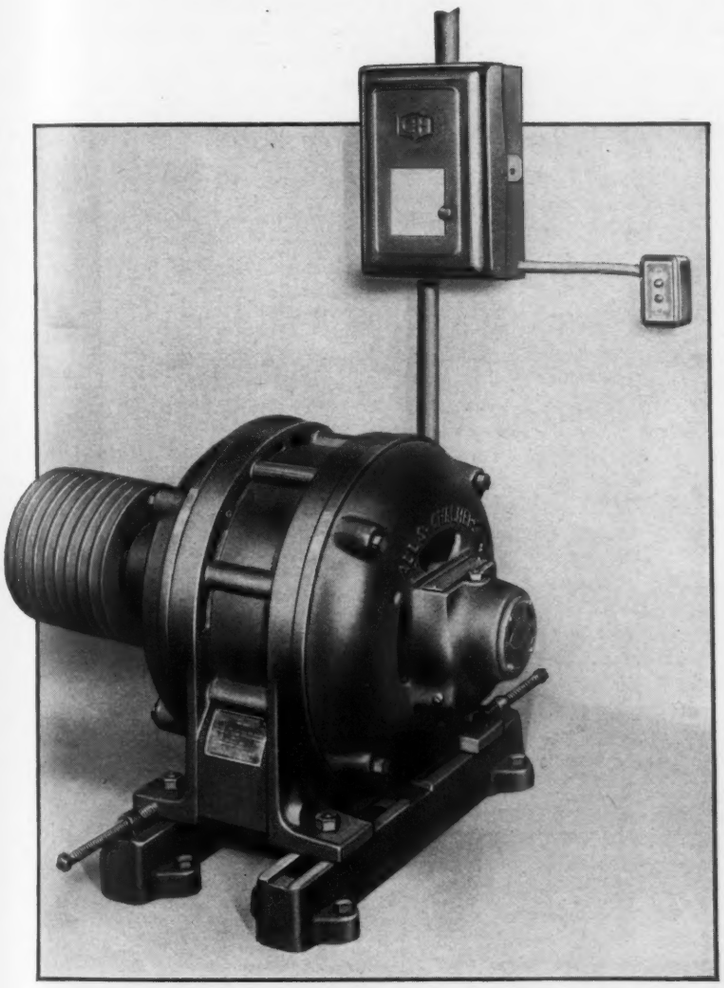
Normal Torque — Type ARX

Line Start Induction Motors

Sleeve or Roller Bearing

On Full Line Voltage the Starting Current is well within limits recommended by N. E. L. A.

The inexpensive Magnetic Switch with Push Button is the only device required for automatic start and stop.



THE design of these LINE-START MOTORS retains the well known superior features of Allis-Chalmers Induction Motors with the added characteristic for starting on full line voltage and holding the starting current well within the recommended limits of the Electrical Apparatus Committee of the National Electric Light Association.

Frames of electric furnace steel with feet cast integral—silver brazed, indestructible, rotors—form wound coils that are sealed by several treatments in special baking varnish to insure resistance to elements — dust-proof and leak-proof bearings—and a special ventilating system of directional air control insuring equal cooling of all parts, are a few reasons why an ever-increasing number of engineers are insisting on Allis-Chalmers Induction Motors.

Line Start Motors are carried in stock in ratings from 7½ to 30 horsepower at all standard speeds.

WRITE FOR BULLETIN 1143

ALLIS-CHALMERS MFG. CO.
MILWAUKEE, WIS.

ALLIS-CHALMERS MOTORS

When writing advertisers, please mention ROCK PRODUCTS

S. G. Taylor Chain Co., Hammond, Ind., has moved its main office to the company's plant in Hammond from Chicago. A sales office will still be maintained in Chicago.

Hercules Motors Corp., Canton, Ohio, lost a frame auxiliary building by fire on March 7. The loss was minor, and operations in the main building, which is of modern fireproof construction, have not been interrupted nor has production been retarded.

D. O. James Mfg. Co., Chicago, announce the addition to their sales department of R. C. Bird, in the capacity of traveling sales manager. Mr. Bird, formerly with the Chain Belt Co. of Milwaukee, has spent about 20 years working with power transmission equipment.

Worthington Pump and Machinery Corp., New York City, has moved its executive offices to No. 2 Park Ave., New York. The head sales office and the advertising department have been moved to the company's plant at Harrison, N. J., which is adequately served by transportation from New York, being adjacent to the Manhattan transfer station of the P. R. R. and to other transportation lines.

R. D. Nuttall Co., Pittsburgh, Penn., announce that as of April 1, 1928, their commercial activities will be handled by and through the parent company, the Westinghouse Electric & Manufacturing Co. All inquiries should be addressed to the nearest Westinghouse district office. J. E. Mullen, formerly assitant sales manager for the Nuttall Co., will head the new commercial set-up with offices at the Nuttall plant.

Interstate Drop Forge Co., Milwaukee, Wis. has elected Charles E. Stone president to succeed O. R. Bessinger, who is a member of the board of directors and president of the Chain Belt Co. of Milwaukee. The Interstate company is a member of the group of affiliated companies which includes the Chain Belt Co., the Sivyer Steel Casting Co., the Nugent Steel Castings Co. and the Federal Malleable Co. Mr. Stone was formerly vice-president of the Interstate company, and prior to that he was connected with the Chain Belt Co.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention Rock Products.

G. E. Bulletins. GEA-808A. Totally enclosed fan-cooled induction motors. **GEA-467A.** Automatic starters for slip-ring motors.

Borium, the Diamond Substitute. 24-page illustrated booklet on the use of "Borium" for drilling. STOODY COMPANY, Whittier, Calif.

Bag Trucks. Illustrated bulletin on new hand truck for handling cloth or paper bags without bag breakage. BATES VALVE BAG CORP., Chicago, Ill.

Elesco-operation. Illustrated bulletin of 16 pages on superheaters and their use in various branches of industry. THE SUPERHEATER CO., New York, N. Y.

Sweeping the Highways. Illustrated bulletin showing operation of large electric magnets on motor trucks. ELECTRIC CONTROLLER & MFG. CO., Cleveland, Ohio.

Line-Start Induction Motors. Illustrated bulletin on line-start induction motors equipped with sleeve or roller bearings. ALLIS-CHALMERS MFG. CO., Milwaukee, Wis.

Two Hot Zone Linings. Bulletin descriptive of the service given by "Arcofrax" high alumina brick in cement kilns. GENERAL REFRACTORIES CO., Philadelphia, Penn.

Higher Quality for Cement Products. Pamphlet describing use of calcium chloride in the manufacture of cement products. SOLVAY SALES CORP., New York, N. Y.

Verdicts You Can Bank On. Illustrated bulletin of statements of various rock products producers concerning this company's equipment. THEW SHOVEL CO., Lorain, Ohio.

Super-hydrated Lime. Illustrated bulletin on automatic batch continuous hydrators, showing drawings of hydrators as well as pictures. STEWART W. JAMESON CO., Duluth, Minn.

Nickel Cast Iron. Bulletin No. 205 on the practical and economic value of nickel and chromium in gray cast iron, fully illustrated. INTERNATIONAL NICKEL CO., New York, N. Y.

Recent Developments in Steam Generation. An illustrated reprint of an address by George T. Ladd discussing developments during the past few years in steam generation. COMBUSTION ENGINEERING CORP., New York, N. Y.

Wagon Drill for the Quarry. Illustrated bulletin on the operation and performance records of drills for quarry use. **Leyner-Ingersoll Drifters.** 32-page illustrated bulletin describing and showing drifter drills in operation in quarries and on other jobs, with drawings showing construction of the drills. **Drill Steel Sharpeners.** 32-page illustrated bulletin on the various machines for drill sharpening, and includes an insert giving a suggested layout for a practical shop for quarry or other operation. **Hoists.** 32-page illustrated bulletin on "Little Tugger" hoists for use where a portable hoisting unit is necessary or desirable. INGERSOLL-RAND CO., New York, N. Y.

Flood Damage to Roads and Bridges in Mississippi Valley

HIGHWAYS AND BRIDGES in the flood districts of Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi and Louisiana were damaged to the extent of $3,949,900 by the recent overflowing of the Mississippi River, the American Road Builders' Association states. Most of the roads damaged have already been repaired in some degree.

Improved highways withstood the onrush of water without serious damage, the association asserts. Roads without improvement were in many cases virtually wiped out, causing an expensive delay in traffic and curtailing the movement of necessary food and shelter supplies. Bridges were completely destroyed in sections where the foundations were not constructed to withstand the swift moving waters.

The damage to public highways and bridges has been estimated at $2,738,100, and the damage to privately owned roads and bridges at $1,211,800. The loss constituted less than 1.7% of the estimated flood losses of $236,334,414 as compiled by the Port of New Orleans. The most serious loss in the flood was that of growing or newly harvested crops, which totaled approximately $73,541,000.

The American Road Builders' Association urged the immediate construction of an adequate highway system designed to withstand the maximum flood waters in those sections subject to overflow. The existence of these roads, it was stated, will facilitate the salvage of personal property, protect human life, and permit speedy reconstruction of damaged areas.

Good roads in the Florida counties struck by the hurricane last year were opened for motor travel within a few hours after the storm had subsided. The quick movement of first aid supplies and rations over these roads unquestionably was responsible for the saving of many lives, it was said.

Northern Pacific Gravel Plant for Horton, Mont.

THE settlement of a condemnation suit to which the Northern Pacific Railroad Co., Fred Dontle and the Pioneer Sand and Gravel Co., Seattle, Wash., were parties, has made possible the building of a sand and gravel plant at Horton, Mont., by the railroad company. The litigation had held up 30 carloads of machinery and equipment which had been shipped.

The plant will furnish gravel and sand for the Northern Pacific from Custer, Rosebud county, Mont., to Mandan, N. D. The gravel supplies of the road as far east as Custer are obtained from the company's Laurel, Mont., plant.

The cost of installing the operation will be about $70,000. The Pioneer Sand and Gravel Co. of Seattle will operate it.—*Livingston* (Mont.) *Enterprise.*

New Iowa Gravel Company

THE LE GRAND CRUSHED ROCK AND GRAVEL CO. is soon to open business at Lake View, Iowa, on a tract of ground south of the town, approximating about 100 acres, which has been leased from the Chicago and North Western Railway Co. It is reported that the company will be affiliated with the Howard Construction Co., of Chicago. It is planned to erect a modern plant for handling washed and screened gravel, the plant to be electrically equipped and the power to be purchased from the town of Lake View. E. H. Lowderbaugh of Des Moines, Iowa, who recently disposed of his interest in the North Western Gravel Co., is to be associated with the new concern.—*Sac City* (Iowa) *Sun.*

OWNERSHIP OF ROCK PRODUCTS

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of ROCK PRODUCTS, published every second Saturday at 542 South Dearborn street, Chicago, Ill., for April, 1928. State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared Nathan C. Rockwood, who, having been duly sworn according to law, deposes and says that he is the manager of ROCK PRODUCTS, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Tradepress Publishing Corp.; Editor, Edmund Shaw; Managing Editor, Nathan C. Rockwood; Business Manager, Nathan C. Rockwood.

2. That the owners of 1 per cent or more of the total amount of stock are: W. D. Callender, Nathan C. Rockwood, both of 542 South Dearborn street, Chicago.

3. That there are no bondholders, mortgagees, or other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other persons, association, or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

NATHAN C. ROCKWOOD,
Business Manager.

Sworn to and subscribed before me this 9th day of April, 1928.

(SEAL) CHARLES O. NELSON.
(My commission expires April 13, 1930.)

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 168

Adamite (Castings)
Mackintosh-Hemphill Co.

Aerial Wire Rope Tramways
American Steel & Wire Co.
Broderick & Bascom Rope Co.
Interstate Equipment Corp.
A. Leschen & Sons Rope Co.

Agitators, Thickeners and Slurry Mixers
The Dorr Co.
Hardinge Co., Inc.
Hetherington & Berner, Inc.
Manitowoc Engineering Works
Morris Machine Works
Polysius Corp.
F. L. Smidth & Co.

Air Compressors
Ingersoll-Rand Co.
Pennsylvania Pump & Compressor Co.
Sullivan Machinery Co.
Traylor Eng. & Mfg. Co.

Air Filters
Dust Recovering & Conv. Co.

Air Line Oilers
Gardner-Denver Co.

Air Pumps
Fuller Lehigh Co.

Air Separators
American Miag Corp.
Dust Recovering & Conv. Co.
Rubert M. Gay Co., Inc.
Hardinge Co., Inc.
Kent Mill Co.
New Haven Sand Blast Co.
Raymond Bros. Impact Pulv. Co.
W. W. Sly Mfg. Co.
Sturtevant Mill Co.
Universal Road Machinery Co.

Ash and Refuse Handling Equipment
Hayward Co.

Automatic Weighers
Merrick Scale Mfg. Co.

Axles
Bethlehem Steel Co.

Babbitt Metal
Westinghouse Elec. & Mfg. Co.

Backfillers
Bucyrus-Erie Co.

Bagging Machinery
Bemis Bro. Bag Co.

Bags
Bates Valve Bag Corp.
Bemis Bro. Bag Co.
Jaite Co.

Bag Ties and Tying Tools
Bates Valve Bag Corp.

Bag Trucks
Bates Valve Bag Corp.

Balls (Tube Mill, etc.)
Allis-Chalmers Mfg. Co.
Fuller Lehigh Co.
Manganese Steel Forge Co.
Manitowoc Engineering Works
Polysius Corporation
W. A. Riddell Co.
F. L. Smidth & Co.
Sturtevant Mill Co.

Bar Benders and Cutters
Koehring Co.

Bearings
American Miag Corp.
Chain Belt Co.
Hyatt Roller Bearing Co.
Webster Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Bearings (Anti-Friction)
Hyatt Roller Bearing Co.

Bearings (Collar Oiling)
Hyatt Roller Bearing Co.

Bearings (Tapered Roller)
Hyatt Roller Bearing Co.

Bearings (Thrust)
Hyatt Roller Bearing Co.

Belting
B. F. Goodrich Rubber Co.
Goodyear Tire & Rubber Co., Inc.
Morse Chain Co.
Robins Conveying Belt Co.
F. M. Welch Eng. Serv.

Bins (Cement, etc.)
Burrell Eng. & Const. Co.
Galland-Henning Mfg. Co.
Hetherington & Berner, Inc.
Manitowoc Engineering Works
Traylor Eng. & Mfg. Co.
Universal Crusher Co.
Webster Mfg. Co.

Bin Gates
Austin Mfg. Co.
R. H. Beaumont Co.
Easton Car & Construction Co.
Fuller Lehigh Co.
Galland-Henning Mfg. Co.
Industrial Brownhoist Corp.
Link-Belt Co.
Manitowoc Engineering Works
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.

Blast Hole Drills (See Drills)

Blasting Machines
Hercules Powder Co.

Blasting Powder
E. I. du Pont de Nemours & Co.
Hercules Powder Co.

Blasting Supplies
Hercules Powder Co.

Block Machines (Concrete)
Consolidated Concrete Machinery Corp.
W. A. Riddell Co.

Blocks (Pillow)
Hyatt Roller Bearing Co.

Blocks (Sheave)
R. H. Beaumont Co.
Sauerman Bros.

Blowers
Northern Blower Co.

Blowpipes
Manitowoc Engineering Works

Blow Torches, Heaters, Etc.
Westinghouse Elec. & Mfg. Co.

Bodies (Motor Truck)
Easton Car & Construction Co.

Brick Hardening Cylinders
Komnick Machinery Co., Inc.

Brick (Insulating)
General Refractories Co.

Brick Loading Apparatus
Komnick Machy. Co.

Brick Machinery (Sand Lime and Slag)
Jackson & Church Co.
Komnick Machinery Co., Inc.
W. A. Riddell Co.

Bucket Conveyors (See Conveyors and Elevators)

Buckets (Dragline and Slackline)
R. H. Beaumont Co.
Page Engineering Co.
Sauerman Bros.

Buckets (Elevator and Conveyor)
Chain Belt Co.
Galland-Henning Mfg. Co.
Hayward Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Manganese Steel Forge Co.
Polysius Corporation
Robins Conveying Belt Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
W. Toepfer & Sons Co.
Webster Mfg. Co.

Buckets (Grab, Clamshell, etc.)
Browning Crane Co.
Hayward Co.
Industrial Brownhoist Corp.
Link-Belt Co.
Owen Bucket Co.
Page Engineering Co.

Buhr Mills
J. B. Ehrsam & Sons Mfg. Co.
Sturtevant Mill Co.

Buildings
H. K. Ferguson Co.

Cableways
R. H. Beaumont Co.
Broderick & Bascom Rope Co.
S. Flory Mfg. Co.
General Electric Co.
Hayward Co.
Interstate Equipment Corp.
Link-Belt Co.
Mundy Sales Corp.
Page Engineering Co.
Sauerman Bros.

Calcining Kettles (Gypsum)
Butterworth & Lowe
J. B. Ehrsam & Sons Mfg. Co.

Caps (Blasting, Electric & Delay Electric)
Hercules Powder Co.

Car Pullers
Bethlehem Steel Co.
Mundy Sales Corp.
Stephens-Adamson Mfg. Co.
Webster Mfg. Co.

Carriers
Stephens-Adamson Mfg. Co.

Cars (Dump)
Austin Mfg. Co.
Easton Car & Construction Co.
Link-Belt Co.

Cars (Quarry and Gravel Pit)
Atlas Car & Mfg. Co.
Bethlehem Steel Co.
Consolidated Concrete Machinery Corp.
Easton Car & Construction Co.
Manitowoc Eng. Works

Castings
Bethlehem Steel Co.
Davenport Loco. & Mfg. Co.
Fuller Lehigh Co.
Hetherington & Berner, Inc.
Link-Belt Co.
Mackintosh-Hemphill Co.

Cement (High Temperature)
General Refractories Co.

Cement Pumps (See Pumps, Air Pumps)

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.
Manganese Steel Forge Co.
Morse Chain Co.

Chain (Elevating and Conveying)
Chain Belt Co.
Philadelphia Gear Works
Stephens-Adamson Mfg. Co.
Webster Mfg. Co.

Chain Drives
Chain Belt Co.
Link-Belt Co.
Morse Chain Co.

Chain Links (Cold Sheet, Repair, etc.)
Bucyrus-Erie Co.

Chemists
Robert W. Hunt Co.

Chutes and Chute Liners
Mackintosh-Hemphill Co.
F. L. Smidth & Co.
Webster Mfg. Co.

Clamshell Buckets—See Buckets (Grab, Clamshell, etc.)

Clamshell Cranes (See Cranes)

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The Dorr Co.

Classifiers
The Dorr Co.

Clay Working Machinery
Bonnot Co.
Mackintosh-Hemphill Co.

Clips (Wire Rope)
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Clutches (Magnetic)
Magnetic Mfg. Co.

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Allis-Chalmers Mfg. Co.
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Bonnot Co.
Bradley Pulverizer Co.
Fuller Lehigh Co.
Rubert M. Gay Co., Inc.
Hardinge Co., Inc.
Pennsylvania Crusher Co.
Polysius Corporation
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Vulcan Iron Works

Cocks (Lubricated-Acid-Proof)
Merco Nordstrom Valve Co.

Compressed Air Rock Drills
Gardner-Denver Co.

Compressed Air Hoists
Gardner-Denver Co.

Compressors
Pennsylvania Pump & Compressor Co.

Concentrators (Slurry)
The Dorr Co.

Concrete Block Machines (See Block Machines)

Concrete Breakers (Pneumatic)
Sullivan Machinery Co.

Concrete Mixers
Consolidated Concrete Machinery Corp.
Niagara Concrete Mixer Co.

Contractors and Builders
Burrell Eng. & Const. Co.
H. K. Ferguson Co.
E. J. Longyear Co.

Controllers, Electric
Westinghouse Elec. & Mfg. Co.

Conveyor Belting (See Belting)

Conveyors and Elevators
American Miag Corp.
Austin Mfg. Co.
R. H. Beaumont Co.
Chain Belt Co.
Consolidated Concrete Machinery Corp.

Architect's model of The Cathedral of Learning

Photograph by courtesy Scientific American

Sinking the great shafts to the bed rock

Rock drillers at work on a shaft

Drillers trimming tops of shafts

Seating the "highest" seat of learning

The Cathedral of Learning, University of Pittsburgh

FROM ground line to tower top six hundred and eighty feet high, the highest seat of learning in the United States. Twelve thousand students will ride up and down the fifty-two stories of this great tower in twelve elevators. The central tower is approximately ninety feet square and the wings are fifty-four feet wide and vary in length from forty to eighty feet.

The floor space provided in this Cathedral of Learning, if created in four-story buildings, would entirely cover the fourteen acres owned by the University. Actually, only a two-hundred-and-sixty-foot square of ground is used, leaving the University twelve acres for still further expansion.

Sounds like the story of the Tower of Babel and it really is a modern engineering miracle. Such an extremely high building required, of course, a "seating" or foundation of bed rock. In sinking shafts to the limestone bed rock from five to twelve feet wide and forty-two to fifty-four feet deep, much soft sand and water were encountered about eighteen feet down. Hard rock had to be blasted through before reaching the limestone bed rock. The existence of water and the great size and depth of the shafts presented serious problems.

The du Pont field representative, H. H. Hamilton of the Pittsburgh office, supervised the blasting work on these shafts, using du Pont Gelatin, one-inch by eight-inch cartridges, detonated with du Pont Delay Electric Blasting Caps.

There is an obvious significance in the frequent association of du Pont explosives and explosives field service with large construction work involving real problems. E. I. du Pont de Nemours & Co., Inc., Explosives Department, Wilmington, Delaware.

DU PONT

REG. U. S. PAT. OFF.

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

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Conveyors and Elevators (Cont.)
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Hayward Co.
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Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Manganese Steel Forge Co.
Polysius Corporation
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Sturtevant Mill Co.
W. Toepfer & Sons Co.
Traylor Eng. & Mfg. Co.
Universal Crusher Co.
Universal Road Machinery Co.
Webster Mfg. Co.
F. M. Welch Eng. Serv.

Coolers (See Kilns and Coolers, Rotary)

Core Drilling (See Drills—Diamond Core)

Correcting Basins
F. L. Smidth & Co.

Couplings (Flexible and Shaft)
Chain Belt Co.
Falk Corp.
Philadelphia Gear Works

Couplings (Hose, Pipe, etc.)
B. F. Goodrich Rubber Co.
Goodyear Tire & Rubber Co., Inc.

Cranes (Crawler and Locomotive)
Atlas Car & Mfg. Co.
Browning Crane Co.
Bucyrus-Erie Co.
Byers Machine Co.
Harnischfeger Corp. (Pawling & Harnischfeger)
Industrial Brownhoist Corp.
Insley Mfg. Co.
Koehring Co.
Link-Belt Co.
Ohio Locomotive Crane Co.
Thew Shovel Co. (Electric, Gasoline & Steam

Cranes (Gantry)
Harnischfeger Corp. (Pawling & Harnischfeger)
Hayward Co.

Cranes (Overhead, Traveling, Electric, etc.)
Harnischfeger Corp. (Pawling & Harnischfeger)

Crusher Protectors
Magnetic Mfg. Co.

Crushers (Hammer)
American Miag Corp.
Dixie Machinery Mfg. Co.
Pennsylvania Crusher Co.
Sturtevant Mill Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
American Miag Corp.
Austin Mfg. Co.
Butterworth & Lowe
Galland-Henning Mfg. Co.
Lewistown Fdy. & Mach. Co.
Mackintosh-Hemphill Co.
Polysius Corporation
Smith Engineering Works
Sturtevant Mill Co.
Traylor Eng. & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.

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Sturtevant Mill Co.

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Link-Belt Co.
McLanahan-Stone Machine Co.

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American Miag Corp.
Galland-Henning Mfg. Co.
Jeffrey Mfg. Co.
Mackintosh-Hemphill Co.
Polysius Corporation
Sturtevant Mill Co.
Traylor Eng. & Mfg. Co.

Cutter Heads
Hetherington & Berner, Inc.

Derricks and Derrick Fittings
Hayward Co.
Mundy Sales Corp.

Detonators
Hercules Powder Co.

Dewatering Machines
The Dorr Co.

Diamond Core Drilling (See Drills, Diamond Core)

Diesel Engines (See Engines, Diesel)

Dippers and Teeth (Steam Shovel)
Bucyrus-Erie Co.
Hayward Co.
Thew Shovel Co. (Steam Shovel)

Ditchers
Hayward Co.
Insley Mfg. Co.

Draglines
Bucyrus-Erie Co.
Harnischfeger Corp. (Pawling & Harnischfeger)
Insley Mfg. Co.
Koehring Co.
Link-Belt Co.
Monighan Machine Co.
Page Engineering Co.
Thew Shovel Co.

Dragline Excavators
Hayward Co.
Monighan Machine Co.
Page Engineering Co.
Thew Shovel Co. (Electric, Gasoline & Steam)

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R. H. Beaumont Co.
Browning Crane Co.
Bucyrus-Erie Co.
Link-Belt Co.
Mundy Sales Corp.
Novo Engine Co.
Page Engineering Co.
Sauerman Bros.

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Dredges
Bucyrus-Erie Co.
Hayward Co.
Hetherington & Berner, Inc.
Manitowoc Eng. Works
Morris Machine Works
Mundy Sales Corp.
F. M. Welch Eng. Serv.

Drill Sharpening Machines
Armstrong Mfg. Co.—Well Drill Bits
Gardner-Denver Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.

Drill Steel
Bethlehem Steel Co.
Gardner-Denver Co.
Ingersoll-Rand Co.

Drilling Accessories
Gardner-Denver Co.
Loomis Machine Co.

Drills (Blast Hole)
Armstrong Mfg. Co.
Loomis Machine Co.

Drills (Diamond Core)
E. J. Longyear Co.
Sullivan Machinery Co.

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Drills (Rock)
Gardner-Denver Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.

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Drives (Short Center)
Link-Belt Co.

Drives (Worm)
Cleveland Worm & Gear Co.

Drums (Magnetic)
Magnetic Mfg. Co.

Dryers
Allis-Chalmers Mfg. Co.
American Miag Corp.
Bonnot Co.
Fuller Lehigh Co.
Galland-Henning Mfg. Co.
Lewistown Fdy. & Mach. Co.
McGann Mfg. Co., Inc.
Manitowoc Engineering Works
Polysius Corporation
Raymond Bros. Impact Pulv. Co.
W. A. Riddell Co.
Ruggles-Coles Div. of Hardinge Co., Inc.
Traylor Eng. & Mfg. Co.

Dust Arresters
Dust Recovering & Conv. Co.
New Haven Sand Blast Co.
Northern Blower Co.
Pangborn Corp.
W. W. Sly Mfg. Co.

Dust Blowers
Dust Recovering & Conv. Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
American Miag Corp.
Dust Recover'g & Conveying Co.
New Haven Sand Blast Co.
Pangborn Corp.
Polysius Corporation
W. W. Sly Mfg. Co.

Dust Conveying Systems
Dust Recovering & Conveying Co.
Fuller Co.

Dynamite
E. I. du Pont de Nemours & Co.
Hercules Powder Co.

Electric Haulage Systems
Westinghouse Elec. & Mfg. Co.

Electric Power Equipment
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Electro Magnets
Magnetic Mfg. Co.

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Elevator Buckets (See Buckets—Elevator)

Elevators (See Conveyors and Elevators)

Emery Mills
Sturtevant Mill Co.

Engineers
American Miag Corp.
Bonnot Co.
Burrell Eng. & Const. Co.
The Dorr Co.
Dust Recover'g & Conveying Co.
H. K. Ferguson Co.
Fuller Lehigh Co.
Hetherington & Berner, Inc.

Engineers (Continued)
Robt. W. Hunt Co.
Kritzer Co.
E. J. Longyear Co.
Manitowoc Engineering Works
H. Miscampbell
F. L. Smidth & Co.
Sturtevant Mill Co.
Webster Mfg. Co.
F. M. Welch Eng. Serv.
R. D. Wood & Co.

Engine Governors
Pierce Governor Co.

Engines (Diesel)
Bethlehem Steel Co.
Power Mfg. Co.

Engines (Gasoline, Kerosene and Oil)
Climax Engineering Co.
Hercules Motors Corp.
Ingersoll-Rand Co.
Mundy Sales Corp.
Novo Engine Co.
Power Mfg. Co.
Wisconsin Motor Mfg. Co.

Engines (Steam)
Ingersoll-Rand Co.
Morris Machine Works
Mundy Sales Corp.

Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Explosives
E. I. du Pont de Nemours & Co.
Hercules Powder Co.

Fans
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Fans (Exhaust)
Jeffrey Mfg. Co.
New Haven Sand Blast Co.
W. W. Sly Mfg. Co.

Feeders
American Miag Corp.
Robins Conveying Belt Co.

Filters (Air)
Dust Recovering & Conv. Co.

Fire Brick
General Refractories Co.

Forges (Oil for Drill Steel)
Gardner-Denver Co.
Ingersoll-Rand Co.

Forgings
Davenport Loco. & Mfg. Co.
Manganese Steel Forge Co.

Frogs and Switches
Bethlehem Steel Co.
Easton Car & Construction Co.
L. B. Foster Co.
Morrison & Risman Co., Inc.
Westinghouse Elec. & Mfg. Co.

Fuel Saving (Cement Kilns)
American Miag Corp.

Furnaces
Raymond Bros. Impact Pulv. Co.
Sullivan Machinery Co.

Fuses (Detonating and Safety)
E. I. du Pont de Nemours & Co.

Fuses (Electrical)
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gaskets
B. F. Goodrich Rubber Co.
Goodyear Tire & Rubber Co., Inc.

Gasoline Engines—(See Engines, Gasoline, Kerosene and Oil)

Gasoline Tanks (See Tanks—Gasoline)

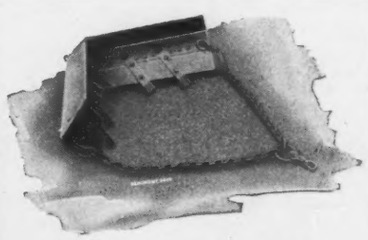
Right Through the Willow Roots

Beaumont Slackline Excavator Demonstrates Remarkable digging qualities under adverse conditions, at Arkadelphia (Ark.) Gravel Co.

Another satisfied customer added to the Beaumont list of installations

The superiority and general ruggedness of the Beaumont Slackline is well illustrated by the above photograph. Due to the unique hook-up and scientific design, this bucket will handle at least 20% over its rated size and with less power. The hoist is used to pull in gravel. Power isn't wasted every trip hauling excess dead weight up to the hopper.

Remember—it digs, elevates and conveys—one man operation. Write for catalog



Beaumont Scrapers furnished in standard sizes of 1/3 to 4 yards. Larger sizes to order. Write for Catalog 95.

R·H· BEAUMONT CO.

313 Arch St., Philadelphia, Pa. **1544-C Straus Bldg., Chicago, Ill.**

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R. D. Wood & Co.

Gears (Spur, Helical, Worm)
Cleveland Worm & Gear Co.
Falk Corp. (Helical)
Horsburgh & Scott Co.
Jeffrey Mfg. Co.
R. D. Nuttall Co.
Philadelphia Gear Works
Palmer-Bee Co.

Gears and Pinions
Chain Belt Co.
General Elec. Co.
Horsburgh & Scott Co.
Mackintosh-Hemphill Co.
Morse Chain Co.
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Horsburgh & Scott Co.
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Joseph Dixon Crucible Co.
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Jeffrey Mfg. Co.
Westinghouse Elec. & Mfg. Co.

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Broderick & Bascom Rope Co. (Wire Rope)
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Joseph Dixon Crucible Co.
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Harrington & King Perforating Co.

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Magnetic Mfg. Co.

Magnetos
Eisemann Magneto Corp.

Magnets
General Electric Co.

Manganese Steel (Plates and Sheets)
Manganese Steel Forge Co.

Manganese Steel (Rolled or Forged)
Manganese Steel Forge Co.

Mechanical Rubber Goods
B. F. Goodrich Rubber Co.

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Bonnot Co.
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Fuller Lehigh Co.
Hardinge Co., Inc.
Jackson & Church Co.
Lewistown Fdy. & Mach. Co.
Mackintosh-Hemphill Co.
Polysius Corporation
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
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Traylor Eng. & Mfg. Co.

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B. F. Goodrich Rubber Co.
Goodyear Tire & Rubber Co., Inc.

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Chicago Perforating Co.
Cross Engineering Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
W. Toepfer & Sons Co.

Pile Drivers
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Pins and Bushings (Forged Manganese Steel)
Manganese Steel Forge Co.

Pipe
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Manganese Steel Forge Co. (Rolled Manganese Dredge Pipe)
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Hercules Powder Co.

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Hardinge Co., Inc.
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Kent Mill Co.
Lewistown Fdy. & Mach. Co.
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Raymond Bros. Impact Pulv. Co.
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F. M. Welch Eng. Service

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Morse Chain Co.
Philadelphia Gear Works

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Steel Fabrication
H. K. Ferguson Co.

Steel Plate Construction
Hendrick Mfg. Co.

Steel (Structural)
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Goodyear Tire & Rubber Co., Inc.

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Hyatt Roller Bearing Co.

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Link-Belt Co.
McLanahan-Stone Mach. Co.
F. L. Smidth & Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.
F. M. Welch Eng. Service

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Westinghouse Elec. & Mfg. Co.

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Manganese Steel Forge Co.
W. S. Tyler Co.

Wire (Manganese Steel)
Manganese Steel Forge Co.

Wire Rope
American Cable Co.
American Steel & Wire Co.
Broderick & Bascom Rope Co.
Interstate Equipment Corp.
A. Leschen & Sons Rope Co.

Wire Rope Fittings
American Cable Co.
Broderick & Bascom Rope Co.
A. Leschen & Sons Rope Co.

Wire Rope Slings
American Cable Co.

Worm Gears (See Gears)

Smooth Operation

We build helical gears into Nuttall speed reducers to get a smooth operation coupled with high mechanical efficiency.

Helical gears operate as smoothly as worm gears, yet they have as high an efficiency as spur or herringbone gears. Helical gears mesh in a manner similar to the way in which the threads of a nut and bolt engage, and do not drive with a series of impulses as is inherent in the operation of a spur gear. Helical gears are quiet in their operation, because with their gradual engagement they eliminate tooth deflection, an inherent cause of noise in spur gears.

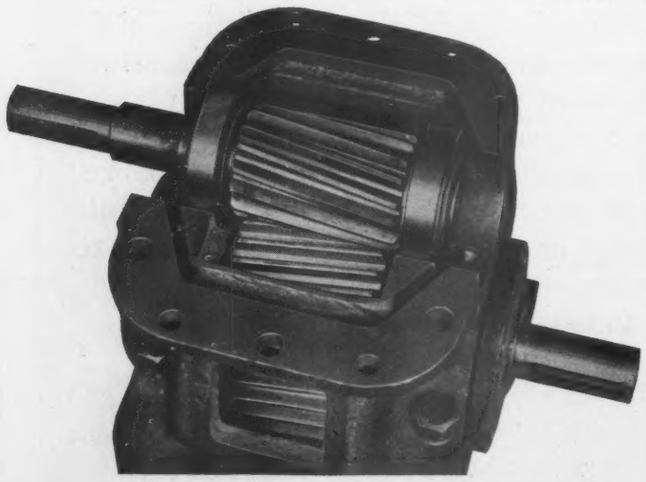
Nuttall speed reducers have a minimum efficiency of 98 per cent in single reductions and 96 per cent in double reductions.

Send for our Speed Reducer Bulletin No. 59

R. D. NUTTALL COMPANY, Pittsburgh, Pa.

All Nuttall Products are sold through the Westinghouse Electric & Mfg Co., district offices. Refer your inquiries to the nearest Westinghouse Office.

Lyman Tube & Supply Co., Montreal, Toronto, Vancouver, Can.



Nuttall

"..continuous and very satisfactory service"

THAT is what one prominent user has to say about three Universal Type "C" Vibrators operating in his plant. This statement was made, too, several months after the three units had been installed, so **"continuous and very satisfactory service"** carries a full measure of meaning from the standpoint of this plant operator.

In any number of leading plants in the rock products field, Universal Vibrators are consistently rendering a distinguished brand of screen service. For highest screening efficiency at lowest cost, you are always safe in specifying—

Universal Vibrators

Our engineers are specialists of long experience in material sizing problems. We will be glad to work with you in the solution of any difficulty you may encounter in this connection.

UNIVERSAL VIBRATING SCREEN CO.
RACINE ~ ~ WISCONSIN

Haul it via the Air Route

"Neither rain nor snow nor heat nor gloom of night stays these couriers from the swift completion of their appointed rounds." Such is the inscription on the facade of the New York post office which denotes the spirit of the air mail service.

And well might similar things be said about Automatic Aerial Tramways—for this is a transportation system that recognizes no obstacles. In all sorts of weather—over hills, rivers and through forests, Automatic Aerial Tramways carry on *always*—providing fast, economical transportation for all classes of material.

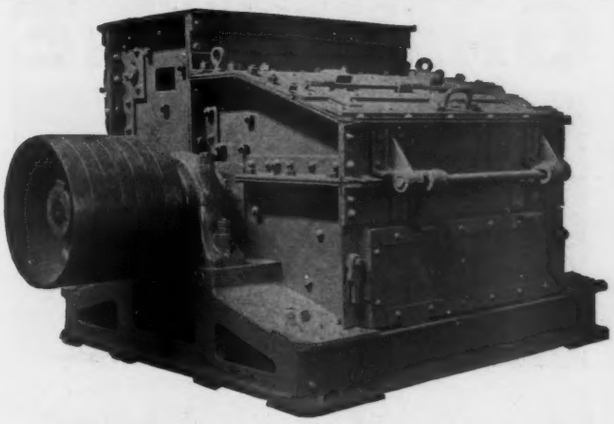
Let our engineers study your transportation problems. No obligation.

Interstate Equipment Corporation
25 Church Street, New York City

AUTOMATIC AERIAL TRAMWAYS

3 REASONS
WHY THE
BONNOT HAMMER CRUSHER
WILL GIVE YOU
LOW COST RESULTS
FOR
Many Crushing Operations

1. ***The capacity is large.***
2. ***Power required per ton is low.***
3. ***Durability or wear resistance.***



The latter we have built into the Bonnot Hammer Crusher by the liberal use of suitable steels, Timken Roller Bearings and large safety factors.

TIMKEN BEARING EQUIPPED

THE BONNOT COMPANY
CANTON, OHIO
Midwest Representatives: **Thaleg & Hock, 236 North Clark Street, Chicago, Illinois**

It is part of Rock Products' conception of its duty to readers and subscribers to help them in every possible and legitimate way. The "Situations Vacant" and "Situations Wanted" advertisements are a part of this service. The charges of 2 cents a word, or a minimum charge of a dollar per insertion, are nominal and not designed for profit. Numerous letters from these advertisers assure us of the effectiveness of these advertisements in finding capable men for openings and of finding openings for capable men.

CLASSIFIED ADVERTISEMENTS

POSITIONS WANTED—POSITIONS VACANT
Two cents a word. Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION
Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, thirty inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

USED EQUIPMENT

MACHINERY FOR SALE

JAW CRUSHERS—2½x4; 4x12; 8x10; 9x15; 10x20; 12x24; 13x30; 24x36; 30x42; 60x84.

GYRATORY CRUSHERS—All sizes, various makes.

CRUSHING ROLLS—8x5; 20x14; 21x11; 24x10; 24x14; 30x16; 36x16; 42x16.

DRYERS AND KILNS—Single shell—3½x16; 4x20; 4x30; 4'9"x36; 5x25; 5x50; 5½x40; 6x40; 7x70; 7x100; 8x80; 9x124; Double shell—3x16; 4x20; 5x30; 6x40; 8x85.

TUBE MILLS—3'x12", 4x16; 5x20; 5x22; 5'6"x16; 5'6"x20.

HARDINGE MILLS—3'x8"; 4½x16; 5x22; 6x22; 8x30; 8x36; 8x48.

PULVERIZERS—2-, 3-, 4-, 5-roll, high and low side Raymond Mills, also Beater types; 33" to 42" Fuller Lehigh Mills, Griffin Mills.

SWING HAMMER MILLS—All sizes—Williams, Jeffrey, Gruendler, Pennsylvania.

Send us your inquiries
Send us a list of your surplus equipment

Consolidated Products Company, Inc.
15-16-17 Park Row N. Y. C. Barclay 0603
Shops and Yards at Newark, N. J., cover 5 acres

MOTOR

52 H.P. G. E. slip ring hoist type, 3 ph., 60 cy., 440 volts, 600 rpm. resistance and reversible drum controller.

DRILL SHARPENER

One I.-R. No. 5, with dies, ¾ in. to 1⅜ in.

AIR COMPRESSOR

One I.-R. 210 ft. portable gasoline engine driven.

BOILERS

Two Springfield Dry Back Scotch Marine type, 150 H.P. each, 135 lbs. steam, 96 in. diam. x 18 ft. long.

CRUSHERS

36x24 Farrell Jaw, Manganese fitted No. 5 Austin, Manganese fitted.

DUMP CARS

Thirty 4-yd. 36 in. ga. Western Steel Beam Portable Track, Rails, Cars, Steel Piling. In stock. Immediate shipment.

Hyman-Michaels Company
Peoples Gas Bldg. Chicago, Ill.
Railway Exchange St. Louis, Mo.

MACHINERY FOR SALE

ROTARY CRUSHERS

Three No. 0, Three No. 1, One No. 1½, One No. 2 Sturtevant Rotary Fine Crushers, Three No. 0, One No. 1 Sturtevant Ring Roll Mill, One No. 2 Duplex Sturtevant Ring Roll Mill.

GYRATORY CRUSHERS

All sizes from No. 2 Reduction up to 12K.

JAW CRUSHERS

One 2"x6", Two 7"x10", Two 9"x15", One 6"x20", One 10"x15", One 10"x20", Two 12"x24", One 13"x30", One 15"x36", One 18"x36", One 24"x36", One 22"x50", One 36"x48", One 40"x42", One 60"x84".

CRUSHING ROLLS

One 8"x6", Two 16"x10", Three 30"x10", Two 36"x16", Two 42"x16", One 54"x24", Two 14"x20", and One 24"x12" Crushing Rolls.

DRYERS

One 3'x20', Three 4'x30', One 5'x40', Two 5½'x40', One 6'x60', One 7'x60', and Two 8'x80' Direct Heat Rotary Dryers, One 5'x25', One 6'x30' Ruggles Coles type "A" and One 4'x20' Ruggles Coles type "B" Double Shell Rotary Dryers, Three 6'x25' Louisville Dryers.

KILNS

One 4'x40', Two 6'x60', Two 6'x90', One 6'x100', One 6'x120', One 7½'x80', Three 8'x125'.

HARDINGE MILLS

Two 3', Three 4½', Three 6' and Two 8' Hardinge Mills.

SWING HAMMER AND TUBE MILLS

Fuller, Griffin and Raymond Mills, Screens, Air Separators, etc.

SPECIAL

One No. 6 Williams Universal Pulverizer.

THE HEINEKEN ENGINEERING CORP.
95 Liberty St. New York City
Telephone Hanover 2450

32 ton, American, 32-in. wheel centers, 175 lbs. pressure, air and steam brakes; completely overhauled.

75 ton, 21x26-in., 6-wheel switcher, piston valve, Walschaert valve gear, superheated; built Dec., 1922.

50 ton, saddle tank, new boiler, new cylinders, new tank, new tires.

17—16-yd. Western dump cars, rebuilt; new bodies, steel lined floors.

10—20-yd. Western dump cars, all steel, vertical air cylinders.

HAVE FORTY LOCOMOTIVES, OVERHAULED AND READY, 5 TO 100 TONS, CARS, SHOVELS, CRANES, RAIL, ETC.

ALSO
LOCOMOTIVE SPRINGS, MANUFACTURED AT OUR WORKS HERE

SOUTHERN IRON & EQUIPMENT COMPANY
(Est. 1889)
ATLANTA - - - - - GEORGIA

CRUSHER

Acme 10x18 Portable with Elevator, Screen and Hopper. N. M.

DREDGE PUMPS

2—American, 15 inch, A. C., motor drive. N. M.
2—Morris, 8 inch, steam drive. G.
2—Morris, 6 inch, steam drive. G.

CENTRIFUGAL WATER PUMPS

10—Allis Chalmers, 10 inch, 180 ft. head, motor drive. N. M.
1—Morris, 12 inch, steam drive. G.
1—Morris, 3 inch, 320 ft. head, motor drive. N. M.

DRAGLINES

Bucyrus, Class 24, Electric. N. M.
Bucyrus, Class 14, Steam. N. M.
P. & H., 206, Gasoline Caterpillar. N. M.

DUMP CARS

4—Western, 6 yd., standard gauge. S. C.
8—K. & J., 4 yd., 36 inch gauge. G.

STEAM HOISTS

2—Stroudsburg, 8¼x10, D. C., 3 drum. N. M.
4—American, 7x10, D. C., 2 drum. G.
2—Lambert, 5½x8, D. C., 2 drum. G.
All with or without Boilers.

STONE SCREEN

1—Heavy Duty, 3 ft. x 12 ft., Roller type, A. C., motor drive. N. M.
N. M. items located at New Milford, Conn.
G. items located at Golconda, Ill.
S. C. items located at Sioux City, Iowa.

For prices or information address
THE U. G. I. CONTRACTING CO.
Attention: R. C. Stanhope, Jr.
Supervisor of Equipment
U. G. I. Bldg. Philadelphia, Pa.

CLASSIFIED ADVERTISEMENTS

POSITIONS WANTED—POSITIONS VACANT
Two cents a word. Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION
Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, thirty inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

USED EQUIPMENT

REBUILT LOCOMOTIVES

72-ton American 6-wheel switcher, separate tender, 180 lb. steam. Three duplicates.
54-ton Baldwin 6-wheel switcher, separate tender, 200 lb. steam; built 1913.
50-ton Baldwin 6-wheel switcher, separate tender; built 1907.
43-ton Baldwin 6-wheel switcher, separate tender, 180 lb. steam; built 1917.
35-ton Baldwin 4-wheel switcher, separate tender, 180 lb. steam; built 1921.
42-ton American 4-wheel saddle tank, 180 lb. steam; built 1910; Ohio boiler.
31-ton Baldwin 4-wheel saddle tank, 160 lb. steam; built 1914.
21-ton Porter 4-wheel saddle tank; built 1912. 36" gauge.

REBUILT DUMP CARS

20-yard all steel Western air dump, vertical cylinders. Ten of these.
12-yard steel underframe hand dumps. Seven of these.
6-yard steel underframe hand dumps. Eight of these.

REBUILT LOCOMOTIVE CRANES

22½-ton Ohio 8-wheel 2-line; built 1915.
20-ton Link-Belt 8-wheel, 2-line; built 1916.
15-ton Ohio 8-wheel, 2-line; built 1919.

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
Birmingham Alabama

FOR SALE

5—8'x125' Rotary Kilns.
1—9'x100' Rotary Kiln.
1—7'x120' Rotary Kiln.
2—7'x100' Rotary Kilns.
1—7½'x80' Rotary Kiln.
5—5'x50' Rotary Coolers or Dryers.
1—5'x6' Edison Giant Roll.
1—Set 36"x30" Smooth Rolls.
1—Set 18"x24" Spike Rolls.
2—8'x6' Ball Mills.
2—10' Morgan Gas Producers.
200 tons 60 lb. Relaying Rails.
2—33-ton Saddle Tank Locomotives.
2—No. 70 Bucyrus R. R. Type Steam Shovels.
1—No. 6 McCully Gyratory Crusher.
1—No. 7½ Kennedy Gyratory Crusher.

Equipment Sales Company
R. W. Storrs, Jr., Manager
Richmond, Virginia, and
Benson Mines, N. Y.

FOR SALE

1—75 H.P. Electric Stripping Outfit.
1—Gas Portable Core Drill.
1—No. 3 Gates Gyratory Crusher with Screens.
1—No. 9-K Gates Gyratory Crusher.
2—No. 8-D Gates Gyratory Crushers.
1—No. 5 Telsmith Gyratory Crusher.
1—No. 7 Williams Fine Grinder.
1—No. 7½-D Gates Gyratory Crusher.
1—18"x36" Farrell Jaw Crusher.
1—36"x48" Traylor Bull Dog Crusher.
1—No. 6 Austin Gyratory Crusher.
2—No. 5-K Gates Crushers.
1—Complete 400 Yard Gravel Plant.
1—Complete Small Stucco Plant.
1—6'x22" Hardinge Conical Ball Mill.
1—41-ton Baldwin Standard Gauge Locomotive.
2—Complete ¾-yd. Gas Cableway Outfits; 1 steam.
1—Sauerman 1-yd. Outfit, without power.
1—Sauerman 2-yd. Electric Outfit, complete.
1—New 200 H.P. G. E. Motor.
1—65' Center Bucket Elevator.
50—Steam and Electric Channelers.
1—33" Fuller Mill.
1—3'x30' Indirect Fired Dryer.
1—42" Gas Whitcomb Locomotive.
1—150' Matthew Gravity Conveyor.

Send us your inquiries and we will send you our offerings from our $15,000,000 Listing.

National Equipment Company
Bloomington, Indiana

In stock 250—24" gauge 2-way Western and Austin dump cars, one and one and one-half yard capacity, in good serviceable second-hand condition. Also a number of new "V" shaped dump cars, 24" gauge: rails, new and relaying and all sorts of tracks supplies of all sections.

Park Row Bldg. New York City **M. K. FRANK** Union Trust Bldg. Pittsburgh, Pa.

4 STEAM SHOVELS

Will Sell Cheap, Account Not Adapted for Our Present Operations. All Mounted on Trucks

1—Marion, 2½-yd. Dipper, 45-ft. boom, 26-ft. Dipper Stick, 2 Boilers, no Light Plant.
1—Marion, 5-yd. Dipper, 90-ft. boom, 56-ft. Dipper Stick, 2 Boilers, Light Plant.
1—Marion, 6-yd. Dipper, 80-ft. boom, 56-ft. Dipper Stick, 2 Boilers, no Light Plant.
1—Marion, 3½-yd. Dipper, 75-ft. boom, 45-ft. Dipper Stick, 2 Boilers, Light Plant.

SUNLIGHT COAL COMPANY
310 S. Michigan Ave. Chicago, Ill.

New—Standard Make

1½ cu. yd. Steam and Electric

SHOVELS

At Greatly Reduced Prices

A two motor electric shovel equipped with 50 hp. hoist and swing motor, and 20 hp. crowd motor. High lift—heavy duty—factory guaranteed.

Also a new heavy duty, high lift steam shovel. Can be equipped with boom up to 32 feet in length.

Either machine recommended for severe operation requiring large output.

Terms to Meet Your Convenience

CHAS. F. COHEN
132-5 Cornell Ave. Elyria, Ohio

Crushers No. 12, 10, 9, 8, 7, 6, 5, 4

Roll Crushers
84x72, 36x60, 72x30, 18x30
60x84—Jaw Crushers—16x60
36x48—40x42—26x50—24x36—20x34—60x84
12x37—18x36—13x30—7x24—7x16—10x22
DISC CRUSHERS, 48", 36", 24", 18"

3 Oil Engines 200 H. P., New

Other Oil Engines, 50-850 H.P.
¾—1 AND 1½—2½-YD. CAT SHOVELS
5 Ton Crane 70' Span A C Motors
AIR COMP.—HOISTS—KILNS
DRAG LINES—LOCO. CRANES—MOTORS

Ross Power Equipment Co.
13 South Meridian St. Indianapolis, Ind.

FOR SALE

4½x52½' rotary dryer or calciner.
8'x80' rotary dryer, single shell.
4x30, 80"x45' and 8'8"x85' Ruggles-Coles Dryers.
42"x40' rotary kiln, cement lined.
3-, 4- and 5-roll Raymond Mills.
No. 1, No. 00 and No. 0000 Raymond Mills.
Infant, No. 2 and No. 6 Williams Mills.
6x22 and 8x48 Hardinge Mills.
30" and 36" Sturtevant buhr-stone mills.
4½x12' Allis-Chalmers Tube Mill.
30"x13" Farrell Jaw Crusher.
42" Fuller-Lehigh Mill.
Style A-2 and B-1 Broughton Mixers.

ROBERT P. KEHOE MACHINERY CO.
7 East 42nd Street New York, N. Y.

Air Compressors

Three Chicago Pneumatic, 212 ft., 80 to 100 lb. air pressure, Type N-SO2, direct Diesel oil engine driven, on 4 steel wheels, air tank, water tank, $975.00 each, f.o.b. St. Louis.

Hyman-Michaels Company
Peoples Gas Bldg. Chicago, Ill. Railway Exchange St. Louis, Mo.

UNIVERSAL CRUSHER COMPANY
Eastern Agents

All Steel Jaw Crushers. Also used equipment in crushing and power lines.

HOOPER-MOMBERGER CO.
90 West St., New York City Phone Rector 2919

When writing advertisers, please mention ROCK PRODUCTS

CLASSIFIED ADVERTISEMENTS

POSITIONS WANTED—POSITIONS VACANT
Two cents a word. Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION
Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, thirty inches to the page.

CLASSIFIED—Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

USED EQUIPMENT

Special Bargains in Used Machinery

1—Gates Gyratory Crusher, No. 6, Style D.
1—Wet Chaser Mill, 8 ft. Double Discharge.
1—Wet Chaser Mill, 6 ft. Single Discharge.
1—Ruggles-Cole Dryer, 60 in. x 24 ft.
1—Ingersoll-Rand Steam Driven Air Compressor, 14 x 14½ x 18.
1—Curtis Air Compressor, Belt Driven (about 60 cu. ft. per M.).
1—Steam Engine, L. H. Drive, 75 H.P.
1—Steam Engine, 16x21.
1—Electric Triplex High Pressure Pump, 200 gal. per minute.
1—General Electric Generator, 170 H.P., 2300 v.
1—Jeffrey Radial Wagon Loader, Electric Traction.
1—Miscellaneous Assortment Shafting, 2-11/16 in. to 3-11/16 in.
1—Miscellaneous Assortment of Pulleys.

DECKERS CREEK SAND COMPANY
P. O. Box 186 Morgantown, W. Va.

Crawler Shovels

1—OSGOOD HEAVY DUTY (1-yd.), GASOLINE Caterpillar, new 1927, 1-yd. dipper; HIGH LIFT; also 40-ft. crane boom if desired, like new.
1—ERIE B-2 DREADNAUGHT, Steam Caterpillar, new 1927, 1-yd. dipper; HIGH LIFT, overhauled, perfect condition.

Cranes

1—NORTHWEST, Model 105, GASOLINE Caterpillar Crane, new 1926, 40-ft. boom. bucket operating, overhauled, excellent condition.
1—15-ton, LINK-BELT, K-2, GASOLINE Caterpillar Crane, new 1926, 50-ft. boom, bucket operating, overhauled.

Grey Steel Products Company
111 Broadway New York, N. Y.

FOR SALE

One 32"x12' Gates screen. Good condition—low price.

L. G. EVERIST, Incorporated
Sioux City, Iowa

Bargain Prices
100,000 Lbs. Capacity
ALL STEEL ORE HOPPER DUMP CARS
MCB condition. Ready for service.
Cheap freight to any part U. S. A.
DULUTH IRON & METAL COMPANY
Duluth, Minn.

FOR SALE

New and used Rotary Dryers. Write us your requirements.

McDERMOTT BROS. CO.
Allentown, Penna.

RAILS New and Relay
ALL WEIGHTS AND SECTIONS
FROGS—SWITCHES—TIE PLATES
S. W. LINDHEIMER
38 S. Dearborn St. Chicago, Ill.

USED EQUIPMENT

COMBINATION SHOVEL CRANE BARGAIN

¾-yd. full caterpillar Thew, in good operating condition, steam power—$3900.00 cash.

HUNTER MACHINERY CO.
Milwaukee, Wisconsin

FOR SALE

1—7x120 ft. Four Tire Rotary Kiln.

Address Box 140, care of
ROCK PRODUCTS
542 So. Dearborn St. Chicago, Ill.

FOR SALE
No. 175 Bucyrus Shovel

75 ft. boom, 50 ft. stick, 3½ yd. bucket. Now operating on coal stripping job near Hickory, Pa. In best possible condition and can be inspected under steam. Price right.

BENTZ BROS. Hickory, Pa.

GASOLINE CRANE BARGAIN

O & S—40-ft. boom, including ¾-yd. Bucket. Used 5 months only, wheel traction, Guaranteed mechanical condition. Cost new over $8000.00—Priced at $3300 cash.

HUNTER MACHINERY CO.
Milwaukee, Wisconsin

USED EQUIPMENT WANTED

Wanted—Dryers and Mills

Two Rotary indirect heat type, similar to Ruggles-Coles "B" or Christie for clay. Also Raymond 5-roll Mill. Give price, specifications, location, age, etc.

Address Box 130, care of Rock Products
542 South Dearborn Street Chicago, Illinois

WANTED

Swing Hammer Mill with about 30 tons per hour cap. Also a 175 C.F.M. belt-driven Air Compressor. Must be in good condition and cheap.

MIKE BECKX Greenleaf, Wis.

Take advantage of the Opportunity offered in the Used Equipment Department to dispose of the equipment that you no longer need.

BUSINESS OPPORTUNITIES

GYPSUM

Mining, Quarrying, Processing, Construction, and Research

The undersigned is available for consultation and service to the Gypsum Products Industry in connection with all problems relating to the production and use of gypsum plaster, stucco, wallboard, tile, etc. I have facilities for testing and research work, and a background of successful experience as a chemist and superintendent of gypsum plants.

Walter B. Lenhart
265 Quincy Ave., Long Beach, Cal.

Quarry for Sale

227 Acres of the Famous Oolitic White, High Calcium Limestone in Ste. Genevieve County, Missouri. The reputation of this particular stone is National in scope, for all purposes, and needs no analysis to prove it. Property can be purchased at a very reasonable price.

Address Box 128, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

POSITIONS VACANT

MANAGER WANTED—PARTY WISHING to retire from active management wants young man with executive ability who understands rock crushing business to take full charge of going plant. Must furnish good references and be financially able to take a third or half interest in the plant. Not over $5000 required. Unlimited market for product. Address Box 133, care of Rock Products, 542 So. Dearborn St., Chicago, Ill.

AN ESTABLISHED MANUFACTURER wants a sales engineer who can get results. Must have a thorough knowledge of drying, grinding and pulverizing in the field of nonmetallic minerals. Send full particulars of selling experience and technical training. Communications confidential. Address Box 137, care of Rock Products, 542 South Dearborn St., Chicago, Ill.

SALES ENGINEER FOR SLACKLINE EXcavators and Drag Scrapers. Must be thoroughly familiar with the sand and gravel trade and able to supervise sales through agencies as well as to sell personally. Apply to R. H. Beaumont Co., 310 S. Michigan Ave., Chicago, Ill. Give all particulars as to past experience and salary expected in first letter.

SUPERINTENDENT WANTED FOR LIMEstone Quarry. Plant 2000 tons per day capacity. Electric operation. Diesel engine shovel. Give full particulars of experience, when available and salary expected to Box 138, care of Rock Products, 542 South Dearborn Street, Chicago, Ill.

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POSITIONS WANTED

AVAILABLE, YOUNG MAN WITH BROAD experience as production clerk and assistant superintendent wishes to make permanent connection with company that will recognize executive ability in the handling of plant shipments, payrolls, operating costs, books and correspondence. Familiar with all phases of crushed stone industry. An adaptable and energetic hustler that can assure efficient results. Address Box 96, care of Rock Products, 542 So. Dearborn Street, Chicago, Ill.

SUPERINTENDENT—20 YEARS' EXPERIence in mill and quarrying operations. Familiar with both steam and electric shovels and heavy drilling and blasting operations. At present employed. Can furnish complete record for whole period with best of references. Address Box 135, care of Rock Products, 542 South Dearborn Street, Chicago, Illinois.

SUPERINTENDENT—DESIRES ENGAGEment; thoroughly familiar with stone crushing, sand and gravel operations; competent and efficient operator; location South or West. Prefer working on bonus basis or tonnage contract. Excellent references. Address Box 99, care of Rock Products, 542 South Dearborn Street, Chicago, Ill.

POSITIONS WANTED

GRADUATE MINING ENGINEER—NINE years nonmetallic mining experience, engineer to superintendent. Thoroughly familiar with the gypsum industry. Desire connection with company that will recognize executive and managerial abilities and one that offers a bright future. Very adept at handling men. Energetic hustler that can get results and assure lower costs. Address Box 136, care of Rock Products, 542 South Dearborn Street, Chicago, Illinois.

SUPERINTENDENT WANTS CONNECTION, twenty years' practical experience, construction, and operation of crushed stone and gravel plants, thorough knowledge of drilling, blasting, shovel operations, transportation, conveying, and milling operations, location anywhere; excellent references, Address Box 139, care of Rock Products, 542 South Dearborn Street., Chicago, Ill.

ENGINEER, EXPERIENCED IN DESIGN, construction and operation; cement, lime, crushing, pulverizing, conveying, ore handling and treating plants. Considerable experience in other industrial manufacturing lines. Address Box 2253, care of Rock Products, 542 South Dearborn St., Chicago, Ill.

POSITIONS WANTED

SUPERINTENDENT—YOUNG MAN WITH thirteen years' experience in charge of quarry and crushing operations in limestone and trap rock. Considerable experience in plant construction. Can produce results. Willing to start for moderate salary. Excellent references. Address Box 134, care of Rock Products, 542 South Dearborn Street, Chicago, Illinois.

SALES ENGINEER WITH LONG EXPERIence with stone crushing machinery is open for engagement. Would prefer interest in quarry operation, preferably in silica sand mill or where fine grinding is required. If you have a mill that is not operating profitably, write me. I can make it pay. Address Box 2280, care of Rock Products, 542 South Dearborn Street, Chicago, Ill.

WANTED—POSITION AS SUPERINTENDent or manager of quarry; 20 years successful experience in larger quarries. References furnished. J. E. Apt, 129 Garen St., Marion, Ohio.

Research Service Department

Rock Products and Cement and Engineering News,
542 So. Dearborn St., Chicago, Ill.

Please send me catalogs and prices concerning the following items checked below:

- Aerial Tramways
- Air Compressors
- Agitators
- Bags
- Bag Printing Machines
- Bagging Machines
- Belt Dressing
- Belting, Conveyor
- Belting, Transmission
- Bins, Batching
- Bins, Storage
- Bin Gates
- Blast Hole Drills
- Blasting Powder
- Block Machines, Cement
- Block Machines, Gypsum
- Bodies, Motor Truck
- Boilers
- Buckets, Clam Shell
- Buildings, Portable
- Cable Coatings
- Cableways
- Calcining Machinery
- Cars, Quarry
- Car Pullers
- Car Replacers
- Cement Block Machinery
- Chain Drive, High Speed
- Chain Hoists
- Chain, Power Shovel
- Chain, Transmission
- Classifiers
- Clutches
- Compressors
- Conveying Equipment
- Cranes, Electric Traveling
- Cranes, Locomotive
- Crusher Parts
- Crushing Plants
- Crushers
- Derricks
- Dragline Excavators
- Dragline Cableway Excavators
- Dredging Pumps
- Drill Steel
- Drill Sharpening Machines
- Drills, Blast Hole
- Drills, Hand Hammer
- Drills, Tripod
- Dryers, Sand and Stone
- Dynamite
- Dump Bodies, Truck
- Dump Cars
- Dump Wagons
- Dust Collecting Systems
- Electrical Control Equipment
- Elevators and Conveyors
- Engineering Service
- Engines, Gasoline
- Engines, Oil
- Engines, Steam
- Fire Brick
- Floor Tile Machines
- Forges
- Frogs and Switches
- Gas Producers
- Gear Speed Reducers
- Gears
- Generators, Electric
- Hand Shovels
- Hoisting Engines
- Hoists
- Hose, Air Drill
- Hose, Pneumatic Tool
- Hose, Steam
- Hose, Water
- Hydraulic Dredges
- Industrial Railways
- Lights, Carbide
- Lights, Flood
- Lime Hydrators
- Lime Kilns
- Loaders, Portable
- Locomotive Cranes
- Locomotives, Electric
- Locomotives, Gasoline
- Locomotives, Steam
- Machine Shop Equipment
- Magnetic Separators
- Mixers
- Motors, Electric
- Motor Trucks
- Moulds, Building Tile, Block, etc.
- Oil Storage
- Oils and Lubricants
- Packing, Hydraulic
- Packing, Piston
- Packing, Sheet
- Packing, Superheat
- Paints and Coatings
- Perforated Metal
- Pipe, Iron and Steel
- Pipe Threading Machines
- Power Transmission Equipment
- Pulleys
- Pulverizers
- Pumps, Centrifugal
- Pumps, Deep Well
- Pumps, Gasoline
- Pumps, Steam
- Pyrometers
- Rails
- Refractories
- Respirators
- Rock Drills
- Roofing Tile Machines
- Rope Drive
- Rope, Manila
- Safety Clothing, etc.
- Sand-Lime Brick Machinery
- Sand Pumps
- Sand Washers
- Scrapers
- Screening Equipment
- Screening Plants
- Screens
- Sheaves
- Steam Shovels
- Steel, High Speed
- Steel, Wear Resistant Alloy
- Stokers, Automatic
- Tanks, Steel
- Tanks, Wood
- Track Material
- Tractors, Caterpillar
- Transformers, Electric
- Turbines, Steam
- Unloaders
- Valves and Fittings
- Washing Equipment
- Weighing Equipment
- Welding, Electric
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- Winches
- Wire Cloth
- Wire Rope

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Individual.....

Address.....

City..... **State**.....

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